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4 QUARTERLY REPORT

Period May 1 through July 31, 1967 6

25

NASA Contract NSR-15-003-055 — 29 CV

Volume II

By

6 Joseph DiSalvo 9

Director

9 August 30, 1967 10 CV

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Profile Description and Sample

Output of Standard Interest Profile

in Computer Area

Computer Information Service

Definition: The Computer Information Service (CIS) serves a twofold

purpose. Primarily the CIS makes available to our member companies those

computer programs which are generated in the course of NASA research.

Secondly, the CIS attempts to keep a member company abreast of developments

in the computer world.

To accomplish these goals the CIS announces the availability of five

new computer programs per month. Information concerning programming

language, operating system and an abstract explaining what each program

does, constitute the program announcements. In addition to these announce-

ments, a Standard Interest Profile (SIP) of the computer-related reports

in STAR and IAA is also provided. The orientation of this profile is

toward new and novel techniques, ideas, innovations, etc., in the computer

field.

The package of program announcements and the Standard Interest Profile

constitute a complete CIS announcement for a given month.

Company Procedure: In order for a company to be added to the mailing list

for our monthly announcement of abstracts, a request to this effect is made

to our Director of Operations. The person or persons who should begin

receiving the announcement should be indicated at the time of this request.

N67-14208*# Villanova Univ., Pa   Research and Development Div.

COMPUTER-AIDED CIRCUIT ANALYSIS Semiannual Report, May 15–Nov. 14, 1966

Tsute Yang and Henry T. Koonce 14 Nov. 1966 11 p refs

(Grant NGR-39-023-004)

(NASA-CR-80835) CFSTI: HC $1.00/MF $0.50 CSCL 09C

New entries to a continuing bibliography on computer aided circuit analysis and design are listed. A reliability prediction and tolerance analysis and adjustment program called STANPAK (Statistical Tolerance ANalysis PAKage) is described. An effort is being made to solve network responses in the time domain using the theory of signal flow graphs with the aid of a small digital computer. The procedure for determining a primitive signal flow graph (PSFG) is outlined. An example is given to illustrate the development of the PSFG along with some comments to indicate the algorithm used to aid in writing a digital computer program.

R.N.A.

N67-14239*# Case Inst. of Tech., Cleveland, Ohio. Digital Systems Lab.

A DIGITAL INTERFACE FOR THE COMPUTER CONTROL OF A REMOTE MANIPULATOR

R J Taylor 1966 135 p refs

(Grant NsG 729)

(NASA-CR-80843, Rept.-1-66-49) CFSTI: HC $4.00/MF $1.00 CSCL 09B

A general purpose interface for communication between a DDP-116 Computer and an arbitrary input/output device was designed and implemented. Its use and operation are described from the viewpoints of a programmer and a device. An additional digital logic system was constructed to multiplex the interface input/output lines with the servo loops of a seven-axis remote manipulator. A General Mills Model 100 manipulator was modified to give it motions comparable to those of a PAR Model 3000.

Author

N67-14252*# Planning Research Corp., Los Angeles, Calif.

TAG USER'S MANUAL

Kenneth O. King, Kenneth Gillett, and William Libaw Jun. 1966 226 p Prepared for JPL

(Contract NAS7-100)

(NASA-CR-80845, R-847) CFSTI: HC $6.00/MF $1.25 CSCL 09C

A Transient Analysis Generator (TAG) program is used for automatic circuit analysis to simulate both transient and steady state behavior of a large class of electrical networks. A special analysis program is generated for each circuit described to TAG; and the language by which circuit topology, parameter values, and type of simulation desired are detailed. The TAG program can handle a wide variety of nonlinear component models. Set up of TAG description and data decks and TAG system deck set-up are detailed following a description of the system. Limitations to TAG simulation are mentioned in this users' manual, and examples of TAG simulations are included. A listing of the users' outputs, TAG-generated solution program, and data outputs that trace a time history of the circuit are presented; and a set of curves shows several of the output variables plotted against time. M.W.R.

N67-17221# Wisconsin Univ., Madison. Mathematics Research Center.
TALKS ON GENERALIZED INVERSES AND SOLUTIONS OF LARGE, APPROXIMATELY SINGULAR LINEAR SYSTEMS
Apr. 1966 98 p refs
(Contract DA-11-022-ORD-2059)
(MRC-TSR-644; AD-638657) CFSTI: $3.00/MF $0.65

CONTENTS:
1. GENERALIZED INVERSES   T. N. E. Greville   p 1-3 ref (See N67-17222 07-19)

N67-17111*# Massachusetts Inst of Tech., Cambridge.
ON-LINE SIMULATION IN THE OPS SYSTEM
Martin Greenberger and Malcolm M Jones *In* NASA. Electron. Res. Center Spaceborne Multiprocess Seminar 31 Oct. 1966 p 81-85 (See N67-17101 07-08) CFSTI: HC $3.00/MF $0.65

The OPS system, an interactive system designed for use in a time-sharing environment, includes an on-line simulation capability A simulation activity is scheduled, cancelled, or rescheduled dynamically on the AGENDA, either at a specified time, or when a prescribed condition is met. The activity can be made to consume simulated time by means of an internal delay for a certain period, or a wait until give conditions are satisfied. The AGENDA is a time-ordered list of all conditionally and unconditionally scheduled activities. The user may inspect it at any point and modify or restructure it. He may base his strategy on data and partial results examined and analyzed with the help of the OPS system during interruption of the run. Extensive tracing facilities permit the user to follow the flow of control during a simulation to any level of detail.   Author

N67-17230# Wisconsin Univ., Madison. Mathematics Research Center.
NOTES   ON   THE   NUMERICAL   SOLUTION   OF SIMULTANEOUS LINEAR ALGEBRAIC EQUATIONS
Ben Noble *In its* Talks on Generalized Inverses and Soln. of Large, Approximately Singular Linear Systems   Apr. 1966 p 25-32   refs (See N67-17221 07-19)   CFSTI: HC $3.00/ MF $0.65

Problems involved in solving systems of linear equations by digital computer are discussed, using the system $Ax = b$, where A and b are known exactly. It is considered that for dense matrices with no special structure, the simplest and best method for solving is the classical method of successive elimination, provided that the pivots are suitably chosen. An illustration is given, and the choice of pivots, partial or complete, is emphasized. Solutions to well-behaved and ill-conditioned sets of two equations in two unknowns are described. Rounding errors are discussed in detail, and a convenient iterative method for improving the accuracy of an approximate solution is described. Numerical examples are included.
                    N E N.

AUTOMATIC MALFUNCTION ANALYSIS BY DISCRETE
NETWORK SIMULATION. APPENDIX C: PROGRAMMERS
REFERENCE MANUAL AUTOMATIC MALFUNCTION
ANALYSIS PROGRAMS

CONTENTS

AUTOMATIC MALFUNCTION ANALYSIS EDITOR
PROGRAM
    The AMA-Editor Program produces the search tapes for
the RCA 110 program from the automatic malfunction analysis
results It operates in three modes, with corresponding changes in tape
requirements. The selection of the operating mode is controlled by
the first data card. Presented are the main program driver outline,
flow charts, data word configurations, and referencing mechanisms.
Subroutines are also discussed with an explanation of their options,
techniques, and interrelationship with other programs through
labeled common.   A.G.O.

RECENT DEVELOPMENTS IN THE MITRE SYNTACTIC
ANALYSIS PROCEDURE
    The MITRE syntactic analysis procedure for transformational
grammars has been used to process sentences on-line in a
display-oriented mode as well as off-line. This report describes
additions to the program structure and the grammar made since
the last report and presents the results of experiments with the
procedure   Author (TAB)

N67 17710# School of Aerospace Medicine. Brooks AFB. Tex
MANIPULATING DATES AND TIME LAPSES IN A COMPUTERIZED RECORDS SYSTEM
Harry M Hughes Sep 1966 17 p
(SAM TR 66 77. AD 641278) CFSTI HC $3 00/MF $0 65 CSCL 09B

A technique for handling dates within a computer as consecutive integers is defined and illustrated Various possible applications are suggested. with an example demonstrating conversion in. conversion out time between dates. number of weekdays between dates and identification of a biweekly report date   Author (TAB)

N67 17966*# North Carolina State Coll, Raleigh.
BIBLIOGRAPHY ON OPTICAL INFORMATION AND DATA PROCESSING
J P Moffatt, A T Shankle, and F J Tischer, comp. Nov 1966 77 p refs
(Grant NGR 34 002 038)
(NASA CR 81662. RR 3) CFSTI HC $3.00/MF $0 65 CSCL 09B

A review of the literature on optical information and data processing was prepared to assist those working in this field to locate quickly literature pertinent to a specialized subject The whole subject area is divided into 22 subtopics in order to accomplish this purpose Subtopic areas such as correlation analysis. diffraction. electromagnetics. holography interferometry. matched filtering. pattern recognition. television photography. and modulation are included   AGO

N67-13341*# Santa Clara Univ., Calif. Dept of Electrical Engineering
PROCEEDINGS OF THE INSTITUTE ON MODERN SOLID STATE CIRCUIT DESIGN
[1966] 165 p refs Inst held in Santa Clara, Calif., 15-16 Sep. 1966. Sponsored by NASA
(NASA CR 80512) CFSTI HC $5.00/MF $1.00 CSCL 09C

CONTENTS

N67-13345*# National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
TOPOLOGICAL ANALYSIS OF ACTIVE NETWORKS
R. M. Carpenter *In* Santa Clara Univ. Proc. of the Inst. on Modern Solid State Circuit Design [1966] p 50-61 refs (See N67-13341 04-10) CFSTI HC $5.00/MF $1.00

A compatible series of computer programs is developed for circuits with large numbers of components, typically 30 to 100. The programs utilize the dichotomy entailed in the flowgraph associated with any active network. Algorithms are established to dichotomize the network into voltage and current generators, to examine separately each set and the associated system of controls interrelating both sets. and to establish a flowgraph in terms of a unique dichotomous representation for a given equivalent circuit. While the algorithms were developed for linear networks, the dichotomous procedures provide an approach which is not so restricted   Author

N67-13346*# Arizona State Univ. Tempe
MATRICES AND STATE VARIABLES
John Staudhammer *In* Santa Clara Univ. Proc. of the Inst. on Modern Solid State Circuit Design [1966] p 62-76 refs (See N67-13341 04-10) CFSTI HC $5.00, MF $1.00

Basic algorithms for matrix manipulations by computer are presented. Matrix formulation and solution of the network equations for a linear lumped parameter network are given. An example for these is shown. Advantages and disadvantages of this procedure are briefly discussed. References are made to pertinent literature
                                      Author

N67-13352*# National Aeronautics and Space Administration. Electronics Research Center, Cambridge, Mass.
COMPUTER ASSISTANCE IN CIRCUIT ANALYSIS AND DESIGN
William W. Happ and John Staudhammer (Ariz. State Univ.) *In* Santa Clara Univ. Proc. of the Inst. on Modern Solid State Circuit Design [1966] p 135–145 refs (See N67-13341 04-10)
CFSTI: HC $5.00/MF $1.00

Salient desirable features of computer programs for circuit analysis are discussed. Gross characteristics of some computer programs are given. A survey to determine the availability of computer routines for solid state circuits includes scope of program extent of present use, range of applications, availability, interchange of programs and feedback of information. The feasibility of a pool of programs for circuit designers is examined.   Author

N67-13558# United Kingdom Atomic Energy Authority, Harwell (England). Chemical Engineering Div.
FORTRAN PROGRAMMES FOR THE PROCESSING OF BOMB CALORIMETRY DATA
P. Hawtin, S. A. Gardner, and R. A. Huber Aug. 1966 24 p refs
(AERE-R-5249) HMSO: 3s 6d

A series of FORTRAN (S2) computer programs for the evaluation of results obtained from an aneroid bomb calorimeter are described. BEDTIME evaluates the delay time from the temperature-time data and hence allows the calculation of the corrected temperature rise from the observed value. ICEBERG calculates the standard energy equivalent of the bomb from a benzoic acid calibration. ADHOC 2 calculates the change in internal energy content of carbon on combustion and the corresponding heat of combustion. Programs ICEBERG and ADHOC 2 require a knowledge of the delay time, found via BEDTIME or otherwise, and they are not therefore specific to data obtained from an aneroid bomb calorimeter. Additionally a subroutine COWBUC, used to calculate the Washburn correction according to the method of Porsen, is described.   Author

N67-13730# Joint Publications Research Service, Washington, D.C.
TELEGRAPH INPUT–OUTPUT DEVICES FOR DIGITAL COMPUTER SYSTEMS
17 Nov. 1966 18 p Transl. into ENGLISH from Mekhaniz. Avtomatiz Proizv (Moscow), no. 8, Aug. 1966
(JPRS-38691; TT-66-35115) CFSTI: $1.00

CONTENTS:
1. DIGITAL RECEIVER-PRINTER FOR TELEGRAPH LINES V. M. Kuprin and Yu. N. Lipin p 1–5 (See N67-13731 04-08)
2. LINKING OF DIGITAL COMPUTERS WITH TELEGRAPH COMMUNICATION CHANNELS AT A COMPUTATION CENTER O. I. Leonov p 8–14 (See N67-13732 04-08)

N67-13731# Joint Publications Research Service. Washington, D C

DIGITAL RECEIVER-PRINTER FOR TELEGRAPH LINES

V M Kuprin and Yu N Lipin *In Its* Telegraph Input-Output Devices for Digital Computer Systems 17 Nov 1966 p 1 5 (See N67-13730 04-08) CFSTI $1.00

A system is described which was developed for monitoring the reliability of information received from telegraph communication lines The digital information, usually statistical and bookkeeping information, is transmitted using telegraphic apparatus via a subscriber telegraph exchange to the central information collection point at the computation center where it is monitored and the output sent to the punchcarrier. A five track tape is used which has a transmission rate of 6 6 symbols/sec, and with good operation of the telegraph apparatus, there is an error rate of only one error per 9000 symbols The system consists of a transmitting and receiving start stop telegraph apparatus, cardpunches, control and monitoring blocks, and a subscriber telegraph station These units are described in more detail   R N A

N67-13732# Joint Publications Research Service. Washington, D C.

LINKING OF DIGITAL COMPUTERS WITH TELEGRAPH COMMUNICATION CHANNELS AT A COMPUTATION CENTER

O I Leonov *In its* Telegraph Input Output Devices for Digital Computer Systems 17 Nov. 1966 p 8 14 (See N67-13730 04-08) CFSTI $1.00

High speed digital computer centers have been developed for the effective control and automatic accounting needed in the transportation of cargo. Telegraph channels are used to transmit cargo information to the computer center. As a result of different transmission rates along the telegraph channels and the different encoding systems used, an intermediate device is needed to match the operation of the digital computer to the information transmission along the telegraph channels Magnetic drum and magnetic tape memories can provide this linkage and adequately handle the large volumes of input information with a very low error rate. These two memory units are discussed and compared. The magnetic drum memory is preferred because no design changes are required,

it is a random access type memory, and it is more economical to operate. Some of the problems related to the operation of the magnetic drum linkage system are discussed   R N A

N67-13746# Battelle-Northwest, Richland, Wash. Pacific Northwest Lab.

"STREAM", A GENERAL ROUTINE FOR GETTING STEADY GROUND WATER FLOW PATHS AND TRAVEL TIMES

R W Nelson *In its* Pacific Northwest Lab. Ann. Rept. for 1965 in the Phys Sci. Vol 3 May 1966 p 14 (See N67-13741 04-13) CFSTI HC $3.00/MF $0.75

A computer program is briefly described which uses the equations derived previously for streamlines in heterogeneous media to provide useful results for waste transport analysis. The program generates paths of flow, determines the permeability along each path, gives the associated travel times for a very wide class of flow problems in porous media. Tests of the accuracy of the numerical results have indicated that very satisfactory answers are obtained with the programs   Author

EXTENSION OF SOLUTION CAPABILITIES BY FINITE DIFFERENCES METHOD TO A LARGE CLASS OF STEADY-STATE FLOW PROBLEMS

The computer program. Steady Darican Flow in Soils, has been enlarged and extended to include capabilities for solving a large class of flow problems. These new features include a variable mesh size for the finite differences expression, a flux input independently controlled at every node, an enlarged number of node points. and the ability, in partially saturated soil, to vary the capillary conductivity completely by inputing soil type curves and varying the base permeability of the soil at any node.   Author

RADIONUCLIDE MIGRATION IN SOIL COLUMNS. DEVELOPMENT OF A COMPUTER PROGRAM

A method to predict radionuclide distribution and breakthrough concentrations was developed for simple soil solution systems. Input data consist of the equilibrium distribution coefficient, weight of soil and volume of soil solution. Experimental and calculated ^{32}P breakthrough curves agreed satisfactorily with the relative breakthrough concentration of 60%.   Author

A COMPARISON OF TWO SURFACE FITTING PROGRAMMES FOR NUMERICALLY CONTROLLED MACHINE TOOLS

The performance of the PMT2 and APT-FMILL programs are compared for the numerically controlled milling of surfaces specified by coordinates of points on a mesh As a test, co-ordinates were calculated for points lying on a portion of the surface of a sphere, where it is intersected by a series of concentric cylinders. These data were supplied to the two programs. and the numerical output from the programs was analyzed to show errors from the spherical surface. Specimens were also milled and measured. Part-programming. computing. and machining times were also noted. For this test-piece the computing costs are similar, PMT2 seems quicker to part-program, and APT-FMILL has smaller errors. Further tests are recommended.   Author

N67-13990# California Univ., Livermore. Lawrence Radiation Lab

TRUMP: A COMPUTER PROGRAM FOR TRANSIENT AND STEADY-STATE TEMPERATURE DISTRIBUTIONS IN MULTIDIMENSIONAL SYSTEMS

Arthur L Edwards 24 Feb. 1966 151 p
(Contract W-7405-ENG-48)
(UCRL-14754) CFSTI: HC $5.00/MF $1.00

The TRUMP computer program was developed to solve problems involving transient and steady state temperature distributions in multidimensional systems with arbitrary geometric configurations, initial conditions, boundary conditions, and physical properties. The mathematical method uses a unique combination of forward and backward difference equations to achieve fast, efficient, and accurate solutions. The program is written in separate versions for the IBM-7094, CDC-3600, and CDC-6600. Problems include heat transfer by conduction, free and forced convection, surface radiation, and mass flow. Heat may be produced or absorbed by internal heat sources and sinks, phase changes, and chemical reaction. The properties controlling these effects may be tabulated functions of time or temperature. Input data are organized to be as simple and clear as possible providing maximum compactness, flexibility, and ease of modification. Optional forms of output include temperature distributions, complete heat balance information, values of variable properties, and a breakdown of the various modes of heat transfer and production at specified time intervals. Graphical output includes plots of temperature vs position at specified time intervals, temperature vs time as specified positions, and position vs time at specified temperatures. Accuracy is determined by the degree to which the system is subdivided into nodes, or volume elements, and by a specified maximum allowable temperature change per time increment. Criteria for ending a problem include exceeding specified time and temperature limits, accomplishment of steady state, and exceeding specified limits on the number of time increments and machine time

Author

N67-14040# Oak Ridge National Lab., Tenn.

A COMPUTER PROGRAM TO CALCULATE HIGH-TEMPERATURE THERMODYNAMIC FUNCTIONS

T. G. Godfrey and J. M. Leitnaker Sep. 1966 37 p refs
(Contract W-7405-ENG-26)
(ORNL-TM-1599) CFSTI: HC $2.00/MF $0.50

A computer program, PLOTHEAT, was written which uses the method of least squares to fit high temperature enthalpy data to one or several selected functions. From the generated equation the heat capacity, C_p^0, the enthalpy, $H_T^0-H_{298}^0$, the entropy, S_T^0, and the free energy function, $(F_T^0-H_{298}^0)/T$, are calculated and tabulated at 100° increments. (The last two quantities assume a knowledge of the entropy at 298.15° K, S_{298}^0.) A subroutine package can be used with the program to plot the computed equation together with the input data using different symbols for each set of data. Author (NSA)

N67-14165# United Kingdom Atomic Energy Authority. Harwell (England) Research Reactors Div

A MONTE CARLO TREATMENT OF THE INTERACTION OF AN ELECTRON BEAM WITH A HEAVY TARGET

M P Ruffle Sep 1966 67 p refs
(AERE R-5172) HMSO 9s

The report describes the general strategy adopted and the treatment of the various reactions involved in investigating the interaction of an electron beam with a heavy target by a Monte Carlo computer program. The purpose of the program is to predict the distribution of the heat generated and the neutrons produced. Some results for typical targets are shown, and the performance of the program in general is discussed Author

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A67-19658

COMPUTER DRIVEN DISPLAYS AND THEIR USE IN MAN/MA-
CHINE INTERACTION.

Andries van Dam (Pennsylvania, University, Moore School of
Electrical Engineering, Philadelphia, Pa.).

IN: ADVANCES IN COMPUTERS. VOLUME 7.

Edited by F. L. Alt and Morris Rubinoff.

New York and London, Academic Press, 1966, p. 239-290. 42 refs.

Contract No. Nonr-551(40).

Discussion of techniques for applying displays in a man/machine
interaction mode to a number of different problems. Specifi-
cally mentioned are (1) nonlinear problems solved by iteration and
varying parameters; (2) problems for which it is easier to draw than
to write; (3) optical alignment or digitizing of bubble-chamber tracks
and general curve fitting, and pattern recognition in general; (4)
architectural layouts; (5) layout drawings for chemical plants; (6) logi-
cal design; and (7) editing and composition.   M.M.

A67-19742   =

AN INTEGRATED FILM READING AND DISPLAY SYSTEM.

Allan H. Gott (Aerospace Corp., El Segundo, Calif.).

IN: SOCIETY OF PHOTO-OPTICAL INSTRUMENTATION ENGI-
NEERS, SEMINAR-IN-DEPTH ON FILMED DATA AND COMPUTERS,
BOSTON, MASS., JUNE 13, 14, 1966, PROCEEDINGS. [A67-19741
07-08]

Seminar sponsored by the Society of Photo-Optical Instrumentation
Engineers and the Electronic Systems Division of the U.S. Air Force.
Redondo Beach, Calif., Society of Photo-Optical Instrumentation
Engineers, 1966, p. VIII-1 to VIII-24. 5 refs.

Contract No. AF 04(695)-669.

Description of an integrated film-reading-and-display system
for providing an overview of system characteristics of the waveform
display/analyzer and a survey of current application activity. The
human sensory systems are presented with a myriad of pattern
inputs. Evaluation and response take place in terms of patterns.

Initial early efforts have developed the hardware and software
required for processing, evaluation, and presentation of results for
computer-graphics filmed data. The results indicate the feasibility
of routinely solving an exceptionally wide variety of multidimensional
pattern problems, when pattern-processing tasks are assigned to
host machinery, and pattern recognition tasks are allocated to the
human operator.   M.M.

A67-19610

DESIGN OF PARAMETRIC PHASE-LOCKED SUBHARMONIC
OSCILLATOR CIRCUITS FOR 3 GHZ INFORMATION RATES.

B. S. Thornton (Honeywell Pty., Ltd., Electronic Data Processing
Div., Sydney, Australia).

Electronics Letters, vol. 3, Jan. 1967, p. 24-26.

Stability analysis of parametric phase-locked subharmonic
tunnel-diode circuits capable of bistable phase operation. A new
type of computer-produced stability-chart plot shows regions of
amplification for desired harmonics used in directional-flow logic
circuits, to allow design for subharmonic pumping.   M.F.

A67-19743 =

THE OPERATION OF THE HOLLOMAN DATA CENTER.
Josef F. Schneider (USAF, Systems Command, Missile Development
Center, Computation Div., Holloman AFB, N. Mex.).
IN: SOCIETY OF PHOTO-OPTICAL INSTRUMENTATION ENGI-
NEERS, SEMINAR-IN-DEPTH ON FILMED DATA AND COMPUTERS,
BOSTON, MASS., JUNE 13, 14, 1966, PROCEEDINGS. [A67-19741
07-08]
Seminar sponsored by the Society of Photo-Optical Instrumentation
Engineers and the Electronic Systems Division of the U.S. Air Force.
Redondo Beach, Calif., Society of Photo-Optical Instrumentation
Engineers, 1966, p. IX-1 to IX-15.
     Description of a data center established for reduction of ABRES
test data. Latest automated film-reading equipment is used in film
digitizing. Data analysis is provided, and a data reduction report
is furnished. It is shown how an automated data center manages
data flow and how the reduction of a large quantity of optically
recorded data can be accomplished without losing quality.   M.F.

A67-19744 #

AUTOMATIC SHAPE DETECTION FOR PROGRAMMED TERRAIN
CLASSIFICATION.
J. K. Hawkins, G. T. Elerding, K. W. Bixby, and P. A. Haworth
(Philco Corp., Aeronutronic Div., Newport Beach, Calif.).
IN: SOCIETY OF PHOTO-OPTICAL INSTRUMENTATION ENGI-
NEERS, SEMINAR-IN-DEPTH ON FILMED DATA AND COMPUTERS,
BOSTON, MASS., JUNE 13, 14, 1966, PROCEEDINGS. [A67-19741
07-08]
Seminar sponsored by the Society of Photo-Optical Instrumentation
Engineers and the Electronic Systems Division of the U.S. Air Force.
Redondo Beach, Calif., Society of Photo-Optical Instrumentation
Engineers, 1966, p. XVI-1 to XVI-9. 6 refs.
     This paper describes an automatic system for classifying and
delineating terrain features in aerial photography. Recognition
algorithms are based upon sharing the burden of image-shape
detection between a special film scanner and a general-purpose
computer. Classification is based upon "common sense" charac-
teristics of terrain categories, implemented by local shape recogni-
tion and binary decision criteria. Procedures are described and
system implications are discussed.   (Author)

A67-19796

HOLOGRAPHIC SYNTHESIS OF COMPUTER-GENERATED HOLO-
GRAMS.
George W. Stroke, Franklin H. Westervelt, and Richard G. Zech
(Michigan, University, Ann Arbor, Mich.).
IEEE, Proceedings, vol. 55, Jan. 1967, p. 109-111. 13 refs.
Navy-ARPA-supported research.
     Demonstration of the possibility of rapidly synthesizing holograms
by means of the Gabor et al. (1965) holographic multiple-exposure
image-synthesis principle, with spherical coherent background. The
holograms thus synthesized are capable of displaying two- and three-
dimensional synthesized objects, by successively exposing a single
hologram from a movable laser-light point with computer-controlled
coordinates.   M.M.

A67-20197

COMPUTABLE ERROR BOUNDS FOR DIRECT SOLUTION OF
LINEAR EQUATIONS.

Bruce A. Chartres (Virginia, University), Charlottesville, Va.)
and James C. Geuder (Brown University, Div. of Applied Mathe-
matics, Providence, R.I.).

An error analysis of direct methods - i.e., Gaussian elimina-
tion or triangular factorization - of solving simultaneous linear
algebraic equations is performed in the backward mode, in which
the computational errors are expressed as perturbations on the data.
Bounds are found for perturbations on the coefficients of the equa-
tions, leaving the right-hand sides unchanged. These bounds can
be evaluated concurrently with the computation itself, with only a
small increase in computing effort. Because they use information
obtained during the solution process, these bounds avoid exaggerating
the magnitude of the error, and so are also useful as error estimates.
(Author)

A67-20058

A DIRECT METHOD FOR COMPUTING TEST PROCEDURES USING
A DIGITAL COMPUTER.

W. H. Brown and R. W. Towles (General Electric Co., Daytona
Beach, Fla.).

The paper presents an operational method for developing test
procedures which allows a test engineer to overcome traditional
machine-language barriers and make direct use of the digital com-
puter. In using this method, the test planner, test procedure
writer, and test engineer are all relieved of much of the difficult
bookkeeping details inherent in the test and checkout of complex
discrete systems. This general-purpose method of test procedure
development utilizes a software simulation technique, and may be
applied to electrical, mechanical, hydraulic, pneumatic, or other
broadly defined systems. In addition to test procedures, valuable
tools for circuit analysis and troubleshooting are also provided.
(Author)

A67-19745

APPLICATION OF IMAGE PROCESSING RESEARCH TO THE
RETRIEVAL OF FILMED DATA.

H. M. Maynard, L. F. Pemberton, and C. W. Swonger (Cornell
Aeronautical Laboratory, Inc., Buffalo, N.Y.).

Discussion of the development of image-scanning systems at the
Cornell Aeronautical Laboratory. Examples of the application of
the scanner-computer combination to filmed data processing are pre-
sented. The progress in computer input-output facilities for
processing photographic information and in computer programs for
performing various filtering and enhancement functions within the
computer is outlined. The need for conversion of filmed data into
various digital techniques for image filtering and processing, is
emphasized.
M.F.

A67-28364 #

END-WALL EFFECTS IN AXIAL COMPRESSORS.

G. L. Mellor (Princeton University, Princeton, N.J.) and
R. E. Strong (Westinghouse Electric Corp., Lester, Pa.).
American Society of Mechanical Engineers, Fluids Engineering
Conference, Chicago, Ill., May 8-11, 1967, Paper 67-FE-16. 8 p.
14 refs.

Members, $0.75; nonmembers, $1.50.

Discussion of end-wall effects in axial compressors showing
that the end-wall blockage effect in axial compressors can be related
to the displacement thickness of boundary-layer theory. An end-
wall hypothesis is introduced to relate the displacement thickness
to end-wall losses. A computer program is constructed to calculate
the entire annulus flow in a compressor, determine cascade losses,
the end-wall loss and displacement thickness. It is found that the
end-wall displacement thickness is strongly correlated with rotor-
tip clearance. A consistent set of results is obtained, to aid future
predictions of compressor efficiency. However, these results are
limited to a rather narrow band of pressure coefficients.   P.v.T.

A67-28439

APPLICATIONS OF ON-LINE COMPUTERS IN RADIO ASTRONOMY.
Sander Weinreb (National Radio Astronomy Observatory, Green
~~~~~ W V~)
IN: PROGRESS IN RADIO SCIENCE 1963-1966; INTERNATIONAL
SCIENTIFIC RADIO UNION, GENERAL ASSEMBLY, 15TH, MUNICH,
WEST GERMANY, SEPTEMBER 5-15, 1966, PROCEEDINGS.
PART 2 - RADIO ASTRONOMY, RADIO WAVES AND CIRCUITS,
AND RADIO ELECTRONICS. [A67-28428 14-07]
Edited by J. W. Findlay, R. C. Hansen, and R. Burgess.
Berkeley, Calif., International Scientific Radio Union, 1957, p. 1284-
1290.

Description of the configuration and application of on-line com-
puters at a radio astronomy observatory. Four Honeywell DDP-116
computers are to be used at the on 36, 140, and 300-ft telescopes
and with a three-element 85-ft interferometer. A major use of an
on-line computer is said to be to provide a real time measurement
of the flux, position, and width of a radio source. A method of using
an on-line computer to increase the sensitivity of a Dicke radiometer
is illustrated.   B.B.

A67-28523 #

CALCULATION OF THE BEHAVIOUR OF A BAR DURING A HIGH-
STRAIN-RATE TENSILE TEST.

R. Botte, D. Rousseau (Ecole Centrale Lyonnaise, Laboratoire de
Métallurgie Physique, Ugine, France), P. Peguin (Ecole Centrale
Lyonnaise, Laboratoire de Métallurgie Physique, Lyons; Institut
National des Sciences Appliquées, Département de Physique, Villeur-
banne, France), and P. Gobin (Ecole Centrale Lyonnaise, Laboratoire
de Métallurgie Physique, Lyons, France).
British Journal of Applied Physics, vol. 18, May 1967, p. 663-670.
6 refs.

Study of the behavior of a cylindrical specimen of finite size,
submitted to a high-strain-rate tensile test and partially fixed at one
of its extremities. The analysis, deduced from a theory for the
propagation of elastoplastic waves in solids, needs a great deal of
calculation which must be done with a computer. A mathematical
treatment is presented which takes into account the discontinuities
of section and material at the ends of the specimen. The program
enables the stress, the particle velocity, the strain, and the strain
rate in different sections of the specimen during the tensile test to
be obtained.   (Author)

A67-14875

STATISTICALLY OPTIMUM OPTICAL DATA PROCESSING WITH
AUTOMATIC FOCUS ESTIMATION.

Robert O. Harger (Michigan, University, Institute of Science and
Technology, Willow Run Laboratories, Radar and Optics Laboratory,
Ann Arbor, Mich.).

The problem of optimally processing data with unknown focus
is investigated. Optimum data processors are found by the method
of maximum likelihood under a variety of assumptions that apply
to most of the situations arising in practice. The unknown focus
may be either an unknown parameter or an unknown random vari-
able; the signal may be of known form or a random function; it is
further assumed that the signal is received in additive, white,
Gaussian noise. The problems of jointly estimating other unknown
parameters and, in the case of a random signal, jointly estimating
the signal, are also treated. The asymptotic variance and correla-
tion of the estimators is discussed. Electrooptical realizations of
the maximum likelihood computers are given. An iterative method
of solution of the likelihood equation is also discussed. The discus-
sion and results are directly applicable to the processing of synthetic
aperture radar data.   (Author)

A67-14498

STRATEGIC VERSUS TACTICAL PLANNING IN MODERN BUSINESS.

H. R. Headley (Radio Corporation of America, Defense Electronic
Products, Missile and Surface Radar Div., Moorestown, N.J.).

Summary of efforts to date in the application of an advanced
feedback-system simulation technique as a strategic planning disci-
pline. The results of an extensive parameter-sensitivity analysis
are presented, and the utility of simulation is evaluated.   M.F.

A67-14811   #

COMPARISON OF ELASTICITY AND SHELL THEORY SOLUTIONS
FOR LONG CIRCULAR CYLINDRICAL SHELLS.

K. T. Sundara Raja Iyengar (Indian Institute of Science, Dept. of
Civil Engineering, Bangalore, India) and C. V. Yogananda (Indian
Institute of Science, Dept. of Mechanical Engineering, Bangalore,
India).

An elasticity solution has been presented by using a Love func-
tion approach for the analysis of a semi-infinite circular cylindrical
shell subjected to a concentrated uniform, circumferential, radial
line load at the end. Solutions according to Timoshenko-Donnell
shell theory and Flügge shell theory also are developed. Numerical
work has been done with IBM-1620 and CDC-3600 digital computers
and the results of the shell theory solutions have been examined in
the light of the results of the elasticity solution.   (Author)

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APPENDIX   C

Guide to the Use of ARAC

Standard Interest Profiles

July 31, 1967

GUIDE TO THE STANDARD INTEREST PROFILES

Since the inception of Standard Interest Profiles (SIP) in November 1966, they have been widely accepted by ARAC member companies. They have become an important part of ARAC's prgram to keep industrial scientists and engineers currently aware of the results of government sponsored research and development. About every two weeks, SIP's provide abstracts of recently released government reports grouped in topic areas of interest to industry. The ARAC staff defines the topic areas and selects reports which are appropriate to them. In contrast, ARAC also offers Custom Interest Profiles (CIP) for which the topic areas are defined by the recipients, usually with the aid of consultation from the ARAC staff.

The subjects covered in SIP's reflect several years of ARAC experience in matching the information requests of industrial scientists and engineers with the type of technical reports being generated by NASA, Department of Defense and other government agencies. This experience has entailed not only the effort of many ARAC staff members, but also the time and consideration of personnel within ARAC member companies. As a result, one of the major benefits of the SIP program is that the descriptions of the profiles themselves provide a useful medium for industrial scientists and engineers to quickly determine what segments of government technical literature may be of interest to them.

To Advance the Generation, Transmission, and Application of Knowledge

These profiles also provide an inexpensive means of keeping abreast of government generated information in the areas selected as being of general interest, but, of course, there is not a SIP for every subject of possible industrial interest. For persons whose interests do not correspond well with any of the SIP topic areas, the Customized Interest Profile (CIP) service is recommended. Here the recipient must take time to define his interests to a member of our staff. Because of the special attention required, the cost of a customized profile is higher, but persons using custom profiles benefit from much more personalized uniqueness in ARAC's selection of abstracts for their consideration. ARAC staff members are able to discuss your interests and give you some preliminary ideas on whether relevant information is available in our current awareness literature base.

In the development of SIP topics, two criteria have been observed. The first criterion is that reports in these areas have been found to be of general interest to scientists and engineers in some sector of private industry. For example, the SIP on "Bearings and Lubricants" has been found useful to a wide variety of companies. The second criterion is that ARAC expects to identify five to fifty reports relevant to each topic every two weeks although there is some variation from one profile to another and often great variation from one biweekly mailing to another.

If you wish to order a Standard Interest Profile, the 'SIP'-prefixed reference number is sufficient to identify it to us. Requests for SIP's may be sent to ARAC at any time, and for member companies we will check membership status and billing details with the company's ARAC coordinator.

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SIP-71   HUMAN FACTORS ENGINEERING

NEW PROFILES

July 31, 1967

Nine new profiles have recently been developed. With these additions we believe that the SIP program includes in some way, most subjects of general industrial interest which can be found to match the NASA base of technical report literature.

SIP-22 VACUUM TECHNOLOGY

SIP-47 PHYSICAL CERAMICS

SIP-49 CONTROL SYSTEMS

SIP-52 SENSORY DEVICES FOR INSTRUMENTATION

SIP-60 SPACE AGE ENERGY SOURCES

SIP-63 INDUSTRIAL APPLIED MATHEMATICS

SIP-68 HEAT TRANSFER

SIP-70 HOLOGRAPHY

SIP-71 HUMAN FACTORS ENGINEERING

One profile has been dropped from the SIP service, SIP-23, PLASMA ENGINEERING.

STANDARD INTEREST PROFILE DESCRIPTION LIST

The description list is as factual as possible and in outline form

for rapid scanning. We have tried to make these descriptions identify

as accurately as possible the subjects of the reports to be provided by

the profile. Although the descriptions are lengthy, we feel that the

detail is useful for telling what is in this literature. Readers who

would like to use this guide to help in describing their own custom

interest profile may reference either entire profile descriptions or

specific paragraphs and sub-paragraphs of the descriptions. The index also

may be helpful for this.

No attempt has been made to classify the reports received into

mutually exclusive categories. Any given report may be cited in several

different SIP's if it is appropriate, and this overlap is reflected in

the descriptions. For example, it is possible to see an abstract regarding

a structural adhesive in both the MATERIALS JOINING profile, SIP-07, and in

REINFORCED PLASTICS, SIP-19, and the same report may even be referenced in

SIP-09, STRUCTURAL ANALYSIS AND MECHANICAL PROPERTIES OF MATERIALS, if a

stress-strain analysis is part of the discussion.

Most of our current awareness service is based on the content of 24

issues per year of SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS and INTERNA-

TIONAL AEROSPACE ABSTRACTS, the two abstracting journals sponsored by NASA,

but with a few profiles we are able to extend our current awareness coverage

to additional sources. Coverage of special sources is indicated in the

descriptions of the profile to which this applies.

MANAGEMENT SCIENCE SERVICE PROFILES

ARAC currently has an experimental program in operation to develop
a set of profiles in management sciences subjects. Profiles judged
useful at the end of this program will be added to this regular list.

SIP-01 INORGANIC FIBER TECHNOLOGY

The intent of this profile is to select reports related to fiber technology for reinforcing metals and ceramics.

Manufacture of Fibers

      Growth of fibers and whiskers, both metallic and ceramic

      Spinning or drawing of fibers and filaments

      Production and testing of glass fibers

      Production of flakes, chips and so on where the particles are chiefly to be used for reinforcement

Testing of fibers, filaments, flakes, etc.

Uses of Fibers for Reinforcements

      Reinforcement of metals and ceramics; fabrication, testing and applications

      Theory of reinforcement of plastics, but not testing or applications of these materials

      Interface properties between matrix and fibers

      Filament winding technology

This profile is thought to be useful not only to persons engaged in the development and production of fibers, but also to designers who wish to use fiber reinforced materials. Most of the reports are written at materials R & D laboratories.

SIP-02 CRYSTAL GROWTH

Reports are selected for this profile which discuss crystal growth; discussion of crystal structure or properties is included only when crystal growth is mentioned in the same report.

Crystal growth and nucleation

Techniques of crystal growth

Vernueil
Czochralski
Hydrothermal
Other

Mechanisms of crystal growth

Growth of various types of crystals

Single
Clusters
Thin film

Conditions for crystal growth

Pressure
Temperature
Atmosphere
Discussions of variation in conditions

SIP-03   CARBON AND GRAPHITE

This profile focuses on carbon and graphite as a structural or insulating material.

Techniques for production of carbon and graphite

Physical properties of carbon and graphite

Crystal growth of both

Crystal structure and defects of both

Testing procedure and apparatus used

Properties of various carbides

Applications frequently mentioned

    Use as refractory material
    Use as nuclear reactor cores
    Carbon and graphite fibers
    Carbon and graphite coatings

About half the reports concern basic research, and the rest are discussions of development and applications.

SIP-04 PHYSICAL METALLURGY

The microstructure of metals is the subject of most reports.

Physical properties of metals

   Crystal structure
   Diffusion mechanisms
   Atomic structure
   Dislocation initiation and movement

Methods of analysis and examination

   Electron microscopy
   X-Ray diffraction
   Micrography
   Occasional reference to sample preparation

Metals usually discussed

   Steel, aluminum, and beryllium alloys
   Pure metals including copper and nickel
   Some reference to high-temperature alloys and refractories
   Limited reference to exotic metals and rare earths
   Numerous references to titanium deleted

   This profile will be of primary value to persons in research and development and perhaps quality control. Because the content is generally detailed and supported by data, a majority of these citations will not find immediate process application. They will, however, assist in development and control problems where materials selection and evaluation are concerned.

SIP-05   POWDER METALLURGY

The manufacture of powder products from powdered metals is the primary subject.

Manufacture of powders of following (only a limited number of citations)

   Ferrous metals
   Refractories in addition to cermets and ceramics
   Occasional reference to uranium
   Reference to graphite and sintered aluminum deleted

Manufacture of powder products

   Equipment and processes including compaction, extruding, and
      forming
   Use of fibers as a strengthening mechanism
   Annealing of powder compacts
   Sintering

Analysis and uses of powders and powder products

Anyone involved in the manufacture of powders or powder products should find this profile useful, including development and production personnel. Those using powder products will also find it of value.

SIP-06 HIGH TEMPERATURE APPLICATIONS OF METALS

Although material development is discussed, the major topic is material application in high temperature environments.

Metals referenced

Metals and alloys used in temperature range (1000° - 3000° F)

Refractories and ceramics

Heat resistant nickel alloys

High-temperature coatings, generally ceramic

Occasional reference to titanium

Fabrication and uses of high-temperature alloys

Properties of these metals

Corrosion resistance, including corrosion prevention

Effects of alloying additions on properties

Although the applicability of this profile is rather specialized, the data contained in these reports should be of substantial value to the design engineer or product development engineer. Anyone desiring information on newly developed high-temperature alloys should also find this profile quite helpful.

SIP-07 MATERIALS JOINING TECHNOLOGY

Materials joining is here interpreted very broadly to include all kinds of materials and fastening methods.

Techniques and processes for joining materials.

    Welding
    Brazing
    Soldering
    Adhesives
    Fasteners

Methods for examining bonds.

    Nondestructive testing for defects.
    Testing for strength of bonds, fatigue strength, etc.

Small amount of information on coating and plating.

Emphasis is usually on new techniques and processes for bonding new or special materials. Some reports also deal with specialized applications (heat shields, etc.). Profile should be useful to the design or product engineer keeping abreast of materials joining techniques and to the individual looking for better or more economical processes for existing joining processes.

SIP-08 MATERIAL FORMING AND MACHINING

Forming and machining processes are usually cited in reference to the fabrication of a particular product. These are the primary subjects.

Forming and machining processes

Laser machining and laser applications in general
High-energy-rate forming including explosive forming
Process oriented articles are frequently cited (i.e., as
applied to the manufacture of a particular product)
Numerically controlled equipment
Occasional reference to conventional processes
(e.g., rolling, EDM, milling, etc.)

Materials usually referenced

Steel and aluminum alloys and numerous nonferrous metals
Limited reference to cermets and ceramics
Occasionally, non-metallic materials including printed
circuit laminates and polymerics

Effects of forming and machining on material properties.

Data on the machining and forming of particular materials will be of interest to the product engineer and perhaps the tool design engineer. Process oriented articles will be of value in laying out a machining or forming facility which is in the design stage or in the re-evaluation of an existing one. In addition, machine designers will find the citations on numerical control valuable.

SIP-09   STRUCTURAL ANALYSIS & MECHANICAL PROPERTIES OF MATERIALS

Both theoretical and empirical reports are cited in this profile which focuses on microphenomena related to design.

Type of analyses

Fatigue analysis

Crack propagation

Mechanical and thermal stress analysis

Structural element designs

Effect of geometry, flaws and defects on structural properties

Materials properties and information on new material are also included when applicable to structural designs.

Both metallic materials and non-metallic materials are included in this profile.

This profile attempts to include information which may have immediate application to practical design problems.

SIP-10 NON-DESTRUCTIVE TESTING

Because many of the reports on this subject deal with
hardware and methods which are operationally practical, this has
been a very useful area for industrial application.

Evaluation and Application of various Non-Destructive Testing
Methods:

Methods more frequently discussed:

Ultrasonic and Sonic
Thermal (Infrared)
X-Rays
Optical

Methods less frequently discussed:

Eddy Current
Gamma Rays
Magnetic Particle
Penetrants
Leak

Testing of various types of bonds:

Welds
Brazed Joints
Adhesive-Bonded Joints

Development and Design of New Testing Equipment

Measurement of Stresses and Detection of Flaws in Various Types
of Materials

Metals
Polymeric Materials
Plastics

Testing of Electronic Components:

Inspection of Printed-Circuit Boards
Thickness Measurements of Films
High-Reliability Screening of Semiconductor and Integrated
   Circuit Devices.

This profile is designed to service persons interested in the
development, design and application of non-destructive testing methods.
To date, the more successful applications have been in the areas of
quality control and reliability testing, stress analysis and thickness
measurements.

SIP-11   CORROSION AND PROTECTIVE COATINGS

The intent of this profile is to provide reports applicable to
industrial corrosion problems and their prevention.

Corrosion

Types reported:

Environmental chemical
Stress corrosion
Wear or fretting corrosion
High-temperature corrosion

Corrosion mechanisms

Crack propagation
Pitting actions

Detection and measurement techniques

Protective coatings

Types:

Paints, organic and inorganic
Claddings and platings

Materials data

Comparison studies
Methods of testing

Application techniques

Deposition
Spraying

Reports on new metals and alloys which are noted for their corrosion
resistance are included, and this feature may make the profile of
value in design work. While many corrosion studies are specialized,
they may be useful for ideas, and reports having general applicability,
such as surveys or handbooks, sometimes are found.

Because it is impossible to consider the problems of bearings and lubricants separately, the two subjects are grouped together in this profile because most persons interested in one are also interested in the other.

Types of bearings reported

    Ball and roller bearings
    Journal and sleeve bearings
    Gas bearings
    Needle bearings
    Self-lubricated bearings
    Non-metallic bearings
    Bearings used in liquid metals (a large volume of this is suppressed)

Types of information reported about bearings

    Bearing design
    Bearings testing
    Failure analyses--rolling contact studies, etc.
    Wear and Corrosion effects
    Effects of vibration, fatigue, stresses--application conditions
    Materials selection and testing for bearings.

Types of lubricants reported

    Oils and greases
    Solid lubricants, many of them coatings
    Self-lubricating materials

Types of lubrication information reported

    Wear testing
    Wear and friction phenomena
    Testing of lubricant and bearing combinations under varying loads,
        speeds and environments
    Analyses of how lubricating phenomena take place, both
        theory and observation
    Novel lubrication methods, example: turbocooler bearings
    Analyses of lubricant composition

Topic related to bearings and lubricants

    Seals and sealing materials
    Nondestructive test methods
    Reliability analysis

The object of much of the work reported is to develop bearings and lubricants for unusual or extreme operating conditions. Another large segment of work is directed toward increasing bearing and lubricant life.

SIP-15 FLUID FLOW

All types of fluid flow reports are identified by this profile except those dealing with aerodynamics, particularly in the regions of supersonic and hypersonic flow.

Compressible flow

Boundary layer conditions
Vortex flow
Effects of geometry

Incompressible flow

Boundary layer conditions
Vortex flow
Effects of geometry

Effects of magnetic fields on flow

Two phase flow

Gas-liquid
Gas-solid
Liquid-solid

Flow measurement

Flow velocity measurement--Pitot tubes, anemometers, etc.
Mass flow rate measurement
Turbulence measurement
Calculations and correction factors

Flow properties of non-Newtonian fluids

Fluid flow applications

In hydraulic systems
Fuel flow in engines and turbines
Fluid logic systems
Fluid amplifiers
Gates, switches, other fluid logic elements
Design and manufacture of fluid logic components
Applications

This profile is designed to be of interest to persons taking an analytical approach to problems of fluid flow. Emphasis is placed on including reports which discuss empirical findings, but a number of reports discuss theory also.

SIP-16   HYDROCARBON FUELS AND COMBUSTION

This profile identifies reports on fuels for air-breathing engines,
with rocket fuels being excluded.   Because the literature base comes from
aerospace work, many of the fuels discussed are for turbines, but fuels
for reciprocating engines are sometimes reported.

Combustion Analysis

Chemical mechanisms of combustion
Thermodynamics of combustion--kinetics
Combustion conditions: velocity, temperature, pressure
Exhaust analysis
Vaporization
Testing--usually of new fuels or additives

Fuel analysis
Chemical content analysis
Fluid flow properties
Corrosion effects, and lubrication effects
Storage properties--microbial contamination
Heat transfer properties (without combustion)

Combustion testing

Test instrumentation
Test methods

The reports cited by the profile are thought to be of interest to
persons interested in internal combustion engine fuels in general, and
to persons interested in aviation fuels in particular.

SIP-17 AIR-WATER POLLUTION AND INDUSTRIAL SAFETY

These topics were grouped together because in the reports
found it is sometimes difficult to separate them so far as applications
are concerned.

Safety in work environments

Nuclear or other radiation hazards (microwave and laser radiation
have been discussed)
Effects of noise
Chemical toxicity studies

Water pollution

In large scale water supply systems
Water reclamation and purification. Most reports discuss
this for small systems, spacecraft, submarines, etc.
Waste management systems
Measurement of pollution

Air pollution

In industrial areas--dispersion of stack gases, etc.
Atmosphere composition and purification, usually discussed
for small systems, spacecraft, submarines, etc.
Detection and measurement of substances in atmosphere--
pollution measurement

Clean room technology

Special work environments

While the volume of reports cited per issue for this profile is
sometimes not very high, a few of these reports have been ones greatly
requested by industry. In order to give better coverage of government
literature in these subjects, the literature base for the profile
includes, besides the regular NASA sources:
United States Government Research and Development Reports
Nuclear Science Abstracts
Aerospace Medicine and Biology

SIP-18   ANALYTICAL CHEMISTRY

The profile cites reports dealing with new equipment and
techniques for analysis of chemical compounds.

Methods of Analysis

Gas chromotography
Nuclear magnetic resonance also ESR
Infrared spectrometry
Mass spectrometry

Materials Analyzed

Meteorites
Special atmospheres
Hydrocarbon fuels
Other compounds difficult to analyze

This profile is designed to aid the analytical chemist in finding
new ways to analyze compounds with the latest equipment. It is also
designed to give them ideas on how to adapt commercial equipment to
special situations. For example, adaptation of equipment for contin-
uous on-line analysis.

SIP-19   REINFORCED PLASTICS

The focus of this profile is centered on various methods of plastic or polymer reinforcement including both theoretical and empirical relationships.

Structural application

> Reinforced plastic composites for aircraft structures
> Applications of reinforced plastics for aerospace use
> Reinforced plastic composites for structural use
> Filament-winding plastics

Chemistry and Physics of Reinforced Plastics

> Curing of reinforced plastics
> Mechanical behavior of fiber reinforced plastics
> Void detection in fiber reinforced plastics
> Elastic properties of fiber reinforced materials
> Effect of fiber spacing in composites

Articles cited by this profile cover all aspects of reinforced plastics: preparation, testing, stress analysis, environmental compatibility, etc., and should be of use in design work and also the manufacture of RFP. The information is also of major use in the R&D of structures and of product replacement.

SIP-20   POLYMER TECHNOLOGY

This profile was designed to include practically all material
that the source literature contains on the subject of plastics,
polymers, rubbers, elastomers, etc. excluding the reinforced plastics
area covered in SIP-19: Reinforced Plastics.

Development and synthesis of polymers, rubbers, and plastics

Improvement or organic resins and study of their
thermal behavior
Curing plastics with gamma radiation
Development of improved adhesives for use at cryogenic
temperatures

Development of lightweight thermal insulation materials
Development of improved sterilizable potting compounds
and conformal coatings.

Industrial & Aerospace Applications for Plastics, Rubbers and Polymers

Encapsulations and coatings for aerospace environments
Temperature limitations of polymeric materials
Adhesion of encapulants in various semiconductor applications
Polybenzamidiazole structural adhesives
Ablative material performance under reentry conditions

Destructive and non-destructive testing of polymers, rubbers and
plastics

Wear of plastics in water
Microwave in nondestructive testing of polymers

Polymer Chemistry and Physics

Decomposition kinetics of ablative materials
Molecular theory for behavior of amorphous polymers
Principles in radiation chemistry of organic compounds
Properties of polyester resin binders
Rheology of a viscoelastic medium

The material contained in this profile will be of use to practically
anyone concerned with material development. The information varies
from basic research to applicability in manufacturing processes. It
generates a bimonthly current awareness that includes all major develop-
ments in the polymer area that is contained in our literature sources.

SIP-21 TEMPERATURE MEASUREMENT

This profile deals with all types and aspects of temperature measurement.

Temperature measurement techniques

Temperature measurement instruments

Thermocouples
Thermistors
Pyrometers
Temperature Probes

Discussion of errors involved in measurement

Temperature measurement under unusual conditions

Temperature measurement of extreme temperatures

Temperature control systems

High speed temperature measurement techniques

Measurement of heat intensity is the focus of this profile, and it may therefore interest persons engaged in controlled temperature processes. Few reports are included which deal with heat transfer measurement and these can be found in SIP-68, HEAT TRANSFER.

SIP-22 VACUUM TECHNOLOGY

An important area in technology is the field of vacuums and low pressures. This profile covers the following areas:

Devices

Pumps
Switches
Seals
Vacuum Chambers
Gauges

Materials Properties

Lubricants
Surface properties

This profile contains abstracts from almost all areas involved with vacuums and low pressures. As such, it should be of use to those working with vacuums and those interested in a continuing survey of properties of materials in a vacuum.

SIP-24 LASER DEVELOPMENTS

New developments in lasers hold promise for the future. This profile surveys the field.

Advances in Laser Technology

New materials for lasers
New Techniques

Surveys and State-of-the-Art Reports

Laser Applications

Communications
Displays
Measurements
distance
velocity
particle size
density
Holography (only survey articles)
Optical radar
Machining and Welding

This profile should be useful to those interested in keeping abreast of this rapidly growing field, but who do not wish to read detailed technical reports. The detailed reports are included in another profile, Laser Research, SIP-25. This profile concentrates on general reports.

SIP-25 LASER RESEARCH

Technical advances in lasers are proceeding rapidly. This profile follows research efforts in the area.

Laser Theory and Mathematical Models

Technical Developments

    Characteristics of materials
    Efficiencies
    Modulation
    Distortion
    Doping
    Q-spoiling

SIP-25 should be useful as a summary of current research efforts.
As such, it condenses into one booklet information from a wide variety of sources, and should be very useful to those building lasers and engaged in research about lasers. Together with SIP-24, LASER DEVELOPMENT, the entire area of laser R & D is covered.

SIP-26   CRYOGENICS AND SUPERCONDUCTORS

The profile includes all reports of work done at very low temperatures.

Equipment

Liquefaction Processes
High Vacuum Equipment
Diffusion Pumps-Getter Pumps
Temperature Measurement

Storage of Liquids

Design of Tanks
Insulation Materials

Thermodynamics

Properties of Gases
Stratification of Liquids
Boiling Characteristics of Liquified Gases

Superconductors

Applications
Theoretical investigations
Covers all phases of superconductivity

This profile is designed for the researcher who works in the field of cryogenics or superconductors.

SIP-27 LOGIC CIRCUITS

Logic device, as defined in this profile, refers to any device having two stable states and two input terminals, each of which corresponds with one of the two states. Numerous combinations and arrangements of such logic devices are utilized in digital computers and control devices.

Development and Design of Various Types of Logic Devices

Binary Multipliers
Gates
Oscillators
Adders
Shift Registers
Memory Units
Fluidic Logic Circuitry
Pneumatic Switching Circuits
Trigger Circuits
Timers

Utilization of Microelectronic Components in Computer Hardware

Large Scale Integration
Fabrication of Integrated Logic Circuits

Design of Digital Computers

Computer Organization
Multiprocessor Computer Systems
Parallel Processing Computer Systems
Utilization of the Computer to Design New Computer Systems

Novel Applications of Logic Devices

Numerical Control Machines
Analog-to-Digital Conversion
Process Control Equipment

This profile is designed to service primarily those persons engaged in the development and design of logic devices, primarily electrical but also fluidic and pneumatic devices. In addition, people involved in the design of digital computer systems and in the application of logic devices would derive some benefit from the reports cited in this profile.

The infrared part of the spectrum is currently finding widespread usage. This profile covers the following areas.

Sensors

    Materials used in infrared detectors
    Detector systems

Absorption and Reflection

Spectra of Various Materials

Applications
    Heat measurement
    Non-destructive testing
    Image analyzers
    Image intensifiers
    Thermal control coatings
    Horizon finders
    Cloud cover scanners

This profile includes abstracts from all areas related to or making use of the infrared part of the spectrum. It should be of use to those engaged in research and development in infrared-sensitive instrumentation, and those who are interested in IR spectra.

SIP-29   PHOTOGRAPHY

This profile covers photography from design to special
applications.

Photographic display systems

Photographic method of studying stellar images

Surveyor television photographs

Cameras

Automatic exposure control systems

Photographic measurements of shock waves

Photomap production

Minimization of non-uniform photographic plate fog

Aerial photography (high resolution)

Calibration of cameras for simultaneous observations

High speed photography

Resolving power of photographic infrared films

Photographic reproduction of cellulose nitrate plates

Laser photography

Photographic data processing

Image transfer for printed circuits

Lunar photography

This profile is designed for people engaged in research, develop-
ment, and design of photographic equipment. Although applications
are included, it is not intended for the amateur photographer.

SIP-30 DISPLAY SYSTEMS

The new technological advances and applications of display systems are the subjects covered in this profile.

Display symbol legibility

Solid state display techniques

Photographic display systems and applications

Display applications (various and wide)

Solid state display devices

Pictorial information displays

CRT displays

Radar display system

Standard radio and telephone daylight display system

Computer driven displays

Integrated film reading and display system

Weather information remoting and display system

Predictor display techniques

Pattern recognition

Apollo display systems

Computer data displays

This profile is intended for people working in research design and development of information displays or CRT's. It may also be useful to persons interested in applications such as computer information displays or air traffic control. This profile does not include racks, stands, easels, store displays, etc.

SIP-31   TELEMETRY

The emphasis of most of the report is on telemetry systems rather than individual components used.

Telemetry of spacecraft navigational and experimental data

Telemetry of monitored biological data

General telemetry of data from remote testing of ground-based equipment

Telemetry data processing systems

Data coding and decoding

Data **modulation** and demodulation

The majority of the reports are oriented toward spacecraft but do have industrial applicability. The transmission of voice communication is suppressed.

SIP-33 RECORDING SYSTEMS

The recording systems discussed are nearly all for the recording of experimental data, but many types are sometimes discussed--audio, video and graphic.

Blood pressure recording device

Multi channel tape recording

High density digital recording systems

Magnetic recording systems

Digital and analog recording techniques

High definition star spectra recording instrument

Wind recording instruments

Multi-audio video tape recording

Mechanical recorders

This profile is designed for persons in research and development as well as for people who use recording systems since reports covering the spectrum from design to applications are included.

SIP-34 SEMICONDUCTOR DEVICES AND MICROCIRCUIT FABRICATION

Technical information concerning fabrication techniques and reliability analysis applicable to the miniaturization and integration of active circuit elements (diodes, transistors, etc.) and passive components (resistors, capacitors, inductors) receives primary emphasis in this profile.

Research and Development of Microcircuit/Semiconductor Materials

Silicon Compounds
Germanium
Gallium Compounds
Indium Compounds

Fabrication of Microelectronic Devices

Doping
Deposition
Encapsulation
Interconnection
Packaging

Reliability Testing of Microelectronic Devices

Voltage Breakdown Analysis
Step Stress Analysis
Radiation Effects Analysis
Screening Programs

Partial List of the Types of Microelectronic Devices Included in the Profile

Transistors
Diodes
Rectifiers
Integrated Circuits
Microcircuits
Thin Film Resistors and Capacitors
Logic Circuits
Optoelectronic Devices (No Lasers or Masers)
Monolithic Circuits
Hybrid Circuits
Organic Semiconductors

This profile is designed to service primarily those persons engaged in the design and fabrication of various microelectronic devices. In addition, those people involved in the research and development of microelectronic devices would benefit from some of the reports cited in this profile. Reports discussing applications of microelectronic devices have been eliminated.

SIP-35 MICROWAVE SYSTEMS

Technical information concerning microwave communication equipment, components and microwave transmission technology receive primary emphasis in this profile.

Development and Design of Microwave Equipment

Transmitters
Receivers
Transceivers
Transponders
Antennas

Development and Design of Microwave Circuit Components

Gunn Diodes
Oscillators
Resonators
Frequency Multipliers
Phase Shifters
Parametric Amplifiers
Circulators
Mixers
Detectors
Varactor Diodes
Filters
Travelling Wave-Tubes
Klystron Tubes

Research and Development of Microwave Transmission Technology

Noise Measurement and Analysis
Radar Transmission
Video Data Transmission
Digital Data Transmission
Analog Data Transmission
Interference and Shielding Analysis

This profile is designed to service primarily those persons engaged in the development and design of microwave devices, especially those devices utilized in communication and radar equipment. In addition, reports concerning important developments in microwave transmission technology are also included as are reports representing novel applications of microwave devices.

SIP-36 RADIO ANTENNAS, TRANSMISSION AND PROPAGATION

Radio frequency transmission and propagation is emphasized in order to make this profile of maximum benefit to persons concerned with commercial radio communications. Persons with more interest in microwave frequency propagation can receive this in SIP-35, MICROWAVE SYSTEMS.

Antennas

Mechanical Design

Configuration design
Reflectors
Dimensions and dimensional stability
Selection of materials

Properties

Signal distortion
Geometry of radiation reflection
Gain and bandwidth characteristics
Arrays and phasing

Transmission and propagation

Field strength measurements
Loss measurements
Attenuation and interference
Effects of nature--weather, solar wind, etc.
Transmission line properties and design

Signal reception and processing

Modulation and demodulation
Multiplexing

Information theory

Encoding and decoding
Error probabilities
Signal-to-noise ratios

SIP-37 RADIO COMMUNICATIONS EQUIPMENT

The intent of the profile is to select reports about equipment useful for voice transmission, leaving the transmission of data to the TELEMETRY profile, SIP-31. Most of the reports are concerned with components rather than communication systems.

Components frequently mentioned:

 Mixers
 Transceivers
 Transmitters
 Transponders
 Receivers
 Amplifiers
 Modulators, demodulators
 Multivibrator systems

Topics excluded:

 Microwave and radar equipment
 Aero-navigation equipment
 Antennas and propagation

The profile is intended to be of interest to the communications industry, particularly businesses involved in design and production of radio equipment.

SIP-40 COMPUTER PROGRAMMING

The profile covers computer software very broadly with applications
in scientific, engineering or business applications. Material may be
actual computer programs, or descriptions of the principles of
operation of the computer process. Related hardware may also be included,
but the principal focus is on computer techniques or programs.
Examples of material covered includes:

Computer techniques and programs

Time shared computer systems

On line applications systems

Real time displays

Simulation techniques

Monte Carlo techniques

Hybrid & digital computation

Arithmetic subroutines

Monitors for user scheduling and resource allocations

I/O routines for disc, drum, consoles and other peripheral devices

Computer control systems--data acquisitions, display and control

Data editing and processing

Specialized languages--programming guides, etc.

Automatic programming systems

Structural analyses techniques using digital computers

Computer-aided design and layout. Example: Circuit analysis

Graphic displays

SIP-42 ENVIRONMENTAL PHYSIOLOGY

This profile intends to cover the effects of various environmental conditions on an organism and the reaction of the organism to such conditions, whether real or simulated. Most of the articles discuss the results of studies, but a few also relate to technology involved. Topics covered include:

Reaction and adaptation of body functions to stress situations

Decompression sickness-causes and therapy

Effects of prolonged exposure to increased or decreased oxygen pressure

Sterilization and contamination

Life in extraterrestrial environments

Physiological reactions to space flight

Life support systems

Gas studies - effects on organisms

It is hoped that this profile might be of interest and use to people engaged in the preparation of man for unusual environments, and to those involved in the study of the physiology and biochemistry of man. It could also be helpful to people in microbiology and sterilization control.

Much of the work cited in these reports originates at various scientific departments of universities and at medical research laboratories and hospitals.

In addition to the two regularly abstracted journals, AEROSPACE MEDICINE AND BIOLOGY (AM&B), a monthly publication, will also be searched as it is received in our library. For the most part, the AM&B articles, the A-80,000 series, are available in the journals in which they appeared.

SIP-43 BIOMEDICAL TECHNOLOGY

This is an interdisciplinary profile programmed for firms
interested in biomedical technological advances. Reports include:

        Bioengineering-design and development of diagnostic
            systems for analyzing physiological states

        Bioelectronics

                development of artificial organs and prosthetic devices
                bioelectric control of prostheses

        Biomedical Telemetry Systems

                monitoring vital biological functions
                in-flight monitoring

        Computer Applications-analysis of drug, biological, medical
            and patient data

        Biophysics

                electron microscopic studies of organisms
                gas chromatographic evaluation of the atmosphere

        Biosimulation

                model construction of human systems
                simulating human functions, both normal and pathological

        Waste and Waste Management

    It is felt that this profile could be useful not only to firms
developing biomedical equipment, but also to those directly engaged in
the use of such equipment, such as medical centers and laboratories, and
to biological research organizations.

    In addition to the two regularly abstracted journals, AEROSPACE
MEDICINE AND BIOLOGY (AM&B), a monthly publication, will also be
searched as it is received in our library. For the most part, the
AM&B articles, the A-80,000 series, are available in the journals
in which they appeared.

Topics of reports cited:

Medical

Effects of radiation on biological tissues

biochemical effects in radiation damage
chemical radioprotective agents
physiological disorders resulting from radiation
    exposure
radiobiology
effects of laser radiation and ultrasound on tissues
radiation induced chromosomal aberrations

Diagnosis

radiography
ultrasonic devices for diagnosis of tumors
use of isotopes in blood volume measurement
body area scanning with isotopes to outline organs
    or lesions in organs

Use of radiation in therapy

radiation immunology
use of lasers in tumor research and treatment
chemotherapy and radiotherapy
megavolt therapy in gynecology
use of lasers in retinal detachment surgery
retinal phototherapy

Personnel Safety, Health Physics

Neutron monitoring for personnel protection
Anticontamination protective clothing
Dosimetry for radiation protection
Safeguards against laser hazards
Standards of health physics to be considered in handling
    radioactive materials

These reports might be of interest to people directly concerned
with radiation damage, as in certain industries, to pharmaceutical
firms, and to people working in the medical sciences.
Many of these articles emanate from medical centers, Public Health
Service agencies, engineering firms, and medical research laboratories.

In addition to the two regularly abstracted journals, AEROSPACE
MEDICINE AND BIOLOGY (AM&B), a monthly publication, will be searched
as it is received in our library. For the most part, the AM&B articles,
the A-80,000 series, are available in the journals in which they
appeared.

SIP-45   TURBINE TECHNOLOGY

All reports explicitly dealing with turbines and their basic
components are identified, as are reports designated as being
specifically applicable to turbines.

Compressors

Combustion in turbines

Bearings and lubricants

High temperature materials for turbines

Fuels and fuel control

Corrosion

Fluid mechanics and heat transfer in fuels

Regenerators

Stress and vibrations

Acoustics

Only reports which specifically relate to turbines are cited
because of the high volume of reports which could possibly be appli-
cable to turbine design or development. Individuals working in turbine
design or engine design and development may find it useful to use
this profile as minimum input and supplement it with other profiles
in the areas of fluid flow, heat transfer, combustion materials, etc.

SIP-47 PHYSICAL CERAMICS

Reports are selected for this profile which are related to the physical properties and microstructure of ceramic materials. The selected reports cover structural phenomena, means of analyzes, and physical properties of ceramics.

Crystalline Structure of Ceramics

Classification
Identification
Correlation with properties

Structural Defects of Ceramics and Metals

Dislocations
Creep
Fracture
Cracks
Cleavage
Other

Analysis of Ceramic Samples

Election Microscopy
X-ray Diffraction
Fractography
Petrography
Sample Preparation
Etchants
Other

Physical Properties of Ceramics

Transverse Strength
Tensile Strength
Expansion Coefficients
Optical Properties
Thermal Conductivity
Emissivity
Other

SIP-49 CONTROL SYSTEMS

The intent of this profile is to identify reports of value
to persons concerned with the design and use of control systems for
specific applications.

Control Theory

Adaptive Control
Stochastic control analysis
Stability analysis
Optimizing systems

Servomechanisms

Hydraulic
Electrohydraulic

Fluid logic controlled systems

Fluid amplifiers
Applications

Control systems design

Hydraulic systems
Switching systems
Electromagnetic systems
Physical components of control systems
Relays
Switches
Amplifiers
Control valves

Applications of control systems

This profile is related to SIP-27, LOGIC CIRCUITS. The difference
between the two is that the CONTROL SYSTEMS profile does not emphasize
the circuitry, but rather the design and use of a complete system.

SIP-52 SENSORY DEVICES FOR INSTRUMENTATION

Sensing devices, as defined in this profile, denotes any device designed to detect, observe or measure a physical property or quantity. Research and development of sensing devices seeks to attain higher accuracies, greater sensitivities, greater capability for measuring extreme values, applicability under more extreme conditions of use, or capability of capturing effects occuring at higher speeds than the state-of-the-art has permitted previously. The emphasis is on the detection of phenomena.

Development and Design of Measuring Devices or Techniques

Types of Devices

    Transducers
    Force balance accelerometers
    Rate gyroscopes
    Potentiometers
    Thermocouples
    Manometers
    Flowmeters

Types of physical properties or quantities being measured

    Noise
    Vibration
    Pressure
    Shock
    Strain
    Displacement
    Acceleration
    Velocity
    Force
    Liquid levels
    Shaft rotation rates
    Optical parameters
    Electrical parameters
    Physical dimensions
    Gas concentrations
    Density
    Flow rates

Calibration Techniques for Sensory and Measuring Devices

Novel Applications for these Devices

This profile is designed to primarily service persons engaged in the design and development of sensing devices and techniques. In addition, persons involved in plant instrumentation work who design their own equipment for special application may benefit from the profile.

SIP-60 SPACE-AGE ENERGY SOURCES

A large amount of research is being done at present on new types of
energy and power sources. This profile covers the following areas:

Fuel Cells
New Battery Developments
Solar Cells
Nuclear Power Sources
Thermionic Generators
Other Sources of Heat and Electricity

This profile presents a continuing review of the latest research
in this rapidly growing area. It should be useful to research workers and others
who would like to keep abreast of new developments in power and energy sources.

SIP-63   INDUSTRIAL MATHEMATICS

Industrial mathematics is defined here as the set of all applied mathematics excluding that subset of mathematics pertaining to operations research. Because mathematics for operations research is not well defined, no attempt was made to make mathematics for science and technology and mathematics for operations research disjoint sets.

This industrial mathematics profile, covering Science and Technology will include the following areas.

Differential Equations

     Partial differential equations
     Hamilton-Jacobi Theory
     Potential equation
     Boundary value problems

Applied Complex Variables

     Functions of a complex variable
     Integration in the complex plane
     Residue calculus
     Application of analytic function theory
     Fourier transforms
     Laplace transforms
     Asymptotic expansions

Analysis

     Continuous functions
     Differentation and integration
     Infinite series

Mathematical Statistics

     Analysis of variance
     Method of least square and curve fitting
     Correlation and regression
     Multiple and partial correlation
     Theory of sampling
     Test of significance based on different distributions
     Statistical theory of estimation
     Sequential analysis

Functional Analysis

     Theory of vector space, branch space, and Hilbert space
     Linear functions and how they operate in above Spaces

Fluid Mechanics   (Mathematical Models)

   Compressible fluids
   Viscous fluids
   Shock theory

Numerical Analysis

   Numerical integrations of ordinary differential equations
   Numerical integration of partial differential equations
   Matrix inversion

Mechanics

   Kinetic theory and statistical mechanics
   Elasticity
   Plasticity
   Relativity
   Analytic dynamics
   Differential geometry

   Since mathematics by definition in order to be useful must be
rigorous, this profile would have its greatest utility for people in the field
of research, advanced design (Model building), and advanced engineering.
Most of the reports originate from universities or mathematics groups in in-
dustry.

SIP-68   HEAT TRANSFER

This profile focuses on all aspects of heat transfer except those which are very specific to heating upon atmospheric re-entry.

Heat Transfer Processes--all types

Conductive
Convective
Radiative

Material Properties Related to Heat Transfer

Heat transfer coefficients
Latent heats
Enthalpy and entropy characteristics
Thermal effects of special nature, thermal cycling effects, for example
Methods for analyzing and calculating these properties

Heat Transfer in Fluid Flow

Theory of effects in fluid flow
Methods of analysis and calculations

Hardware Used in Heat Transfer

Heat exchangers
Instrumentation for measuring heat flux
Insulating materials and techniques

Measurement of temperature is not included in this profile, but is the subject of a separate profile, SIP-21, TEMPERATURE MEASUREMENT. Some specialists in heat problems may have interest in both profiles.

This profile includes applications as well as the technological state of the art in holography.

Holographic reconstruction

Holography resolution

Holography color imagery

Holography imaging

Hologram filtering

Microwave holograms

Hologram aberation

Hologram magnification

Hologram coherence effects

Holographic interferometric measurements

Low spatial frequency holograms

Schlieren holographic - ray tracing

Holographic information for transmission

Holography applications to plasma diagnostics

Synthetic holographic techniques

Holography applications in vibration analysis and flow

This profile is thought to be useful to persons in holographic research, design, and development. Since applications are also included, the profile may be of value to people with a general interest in the use of holography.

SIP-71 HUMAN FACTORS ENGINEERING

Designing equipment to fit people is a growing aspect of engineering, and this profile cites reports dealing with the physical and psychological capabilities of man.

Study of interaction between man and machine.

Human performance and response to a system.

Analysis and prediction of human performance.

Information theory as applied to human factors engineering.

Determination of human factors to be considered in design of equipment.

Human decision-making in manual control systems.

Psychological and physiological factors relevant to display systems.

The reports cited in this profile should be of interest to those concerned with human factors criteria and information applied to design problems. They relate both to human factors to be considered in the design of a system and to the human operator's response to a system.

Much of the work reported in this profile has been done at systems technology firms, aeronautical laboratories, and aircraft companies.

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Solid lubricants, SIP-13
Solid state circuits & components, SIP-34
Solid state display devices, SIP-30
Stability analysis, SIP-49
Statistics, SIP-63
Steel, SIP-04
Sterilization, SIP-42
Stress analysis, SIP-09, SIP-19
Structural analysis, SIP-09
Structural element design, SIP-09
Structural properties of materials, SIP-09
Superconductivity, SIP-26
Surface properties, SIP-22
Switching circuits, SIP-27
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T

Tape recording, SIP-33
Telemetry, SIP-31
Temperature measurement, SIP-21, SIP-52
Temperature control, SIP-21
Test equipment, SIP-10
Theoretical mechanics, SIP-09, SIP-63
Thermal insulation, SIP-03, SIP-06, SIP20, SIP-26, SIP-68
Thermal stress analysis, SIP-09, SIP-68
Thermal test equipment, SIP-10, SIP-68
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Thermisters, SIP-21, SIP-52
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Thin-film circuit fabrication, SIP-34
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U

V

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W

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Water pollution, SIP-17
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<u>X</u>

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<u>Y</u>

<u>Z</u>

APPENDIX   D

Brief Description of ARAC

Standard Interest Profiles

August 15, 1967

STANDARD INTEREST PROFILES

Since the inception of Standard Interest Profiles (SIP) in November, 1966, they have been widely accepted by ARAC member companies and are an important part of the ARAC program to keep industrial scientists and engineers currently aware of the results of government supported Research and Development. About every two weeks SIP's provide abstracts of recently released government reports grouped in areas of interest to industry. The ARAC staff defines the topic areas and selects reports appropriate to them.

There are now a total of 46 Standard Interest Profiles available. They cover a full range of technological subjects, and we at ARAC believe they represent a good mapping of the material in our information base which has been found to be of general industrial interest. Nine new profiles have been added to the list beginning with Issue 14, 1967 (August 30, 1967). With the exception of SIP's 42, 43 and 44, those persons who have been receiving SIP's will find little change in them. One SIP has been dropped, SIP-23, PLASMA ENGINEERING. ARAC will continue to refine and develop these profiles so as to make them as useful as possible to the recipients.

Besides this brief description of the SIP's, ARAC has a book on them, "GUIDE TO THE STANDARD INTEREST PROFILES", for persons who wish to review in detail the kind of reports that are available in the SIP topics. This guide may be quite helpful in reviewing government report literature if you are trying to decide whether it will be of value to you, and if so, what kind of reports you can expect to have brought to your attention.

Standard Interest Profiles have been developed with two criteria in mind. First, the subject areas selected have been found to be of interest to several people in industry. In some cases we have detected remarkable commonality in the interests of different industries. For example, there are very few manufacturers who do not have someone interested in developments in bearings and lubricants. Nearly everyone uses them.

A second criterion is that ARAC should be able to consistently provide reports in the subject areas outlined. This means that we expect to be able to provide 5 to 50 abstracts of reports on the subjects every two weeks; and ARAC will provide recipients with full copies of the reports cited by the N-prefixed abstracts. Because of this report quantity criterion, any Standard Interest Profile will cite reports in a broader subject area than that in which some recipients will be interested. Conversely, some recipients will find that two or three standard profiles are required to cover their interests. But we expect that many persons will find one or two standard profiles both interesting and useful.

However, if your interests are such that no selection of Standard Interest Profiles is convenient to satisfy them, the SIP descriptions may help you identify the type of government report information which is available so that you may design your own Custom Interest Profile (CIP). These are more expensive than the SIP's, but the service is custom-tailored. The ARAC staff can help you make an optimal selection of both Standard Interest Profiles and Custom Interest Profiles to fit your needs.

Sample abstracts are enclosed to show the form in which they will be mailed to you. If in reviewing the abstracts you wish to read the full text from the report cited, full copies of N-prefixed reports can be ordered from the American Institute of Aeronautics and Astronautics. Complete information on how to order is included with each mailing of the abstracts.

Each of the profiles has a SIP identification number which can be used in ordering the profiles or in referencing them in correspondence with us. Any comments or suggestions about the Standard Interest Profiles are welcome.

STANDARD INTEREST PROFILES
TITLE LIST

SIP-01 INORGANIC FIBER TECHNOLOGY
SIP-02 CRYSTAL GROWTH
SIP-03 CARBON AND GRAPHITE
SIP-04 PHYSICAL METALLURGY
SIP-05 POWDER METALLURGY
SIP-06 HIGH TEMPERATURE APPLICATIONS OF METALS
SIP-07 MATERIALS JOINING TECHNOLOGY
SIP-08 MATERIAL FORMING AND MACHINING
SIP-09 STRUCTURAL ANALYSIS & MECHANICAL PROPERTIES OF MATERIALS
SIP-10 NON-DESTRUCTUVE TESTING
SIP-11 CORROSION AND PROTECTIVE COATINGS
SIP-13 BEARINGS AND LUBRICANTS
SIP-15 FLUID FLOW
SIP-16 HYDROCARBON FUELS AND COMBUSTION
SIP-17 AIR-WATER POLLUTION AND INDUSTRIAL SAFETY
SIP-18 ANALYTICAL CHEMISTRY
SIP-19 REINFORCED PLASTICS
SIP-20 POLYMER TECHNOLOGY
SIP-21 TEMPERATURE MEASUREMENT
*SIP-22 VACUUM TECHNOLOGY
SIP-24 LASER DEVELOPMENTS
SIP-25 LASER RESEARCH
SIP-26 CRYOGENICS AND SUPERCONDUCTORS
SIP-27 LOGIC CIRCUITS
SIP-28 INFRARED TECHNOLOGY
SIP-29 PHOTOGRAPHY
SIP-30 DISPLAY SYSTEMS
SIP-31 TELEMETRY
SIP-33 RECORDING SYSTEMS
SIP-34 SEMICONDUCTOR DEVICES AND MICROCIRCUIT FABRICATION
SIP-35 MICROWAVE SYSTEMS
SIP-36 RADIO ANTENNAS, TRANSMISSION AND PROPAGATION
SIP-37 RADIO COMMUNICATIONS EQUIPMENT
SIP-40 COMPUTER PROGRAMMING
SIP-42 ENVIRONMENTAL PHYSIOLOGY
SIP-43 BIOMEDICAL TECHNOLOGY
SIP-44 NUCLEAR BIOLOGY
SIP-45 TURBINE TECHNOLOGY
*SIP-47 PHYSICAL CERAMICS
*SIP-49 CONTROL SYSTEMS
*SIP-52 SENSORY DEVICES FOR INSTRUMENTATION
*SIP-60 SPACE-AGE ENERGY SOURCES
*SIP-63 INDUSTRIAL MATHEMATICS
*SIP-68 HEAT TRANSFER
*SIP-70 HOLOGRAPHY
*SIP-71 HUMAN FACTORS ENGINEERING

* New profiles available August 30, 1967

DESCRIPTIONS

SIP-01 INORGANIC FIBER TECHNOLOGY. All types of metallic, ceramic or glass fibers. Most applications are in reinforcement of plastics, ceramics or metals. Development and production of fibers. Theory and testing.

SIP-02 CRYSTAL GROWTH. All forms of crystal growth. Specific techniques, such as Vernueil or Czochralski. Mechanisms of crystalline growth, both single crystals and thin films.

SIP-03 CARBON AND GRAPHITE. Production and application of carbon and graphite materials, with emphasis on structural applications, many of them for high temperature insulation and parts.

SIP-04 PHYSICAL METALLURGY. Crystalline structure of metals, solid solutions, precipitates, diffusion, atomic structure, dislocations, cleavage, hardening and phase transformations. Methods of analysis such as electron microscopy, X-ray diffraction, fractography, microscopy, etchants and sample preparation.

SIP-05 POWDER METALLURGY. Forming, pressing, sintering, compacting, and extruding of products made from powdered metals. Surface preparation of the powders and extraction of powders from ores. Also phases and phase changes in powdered metals.

SIP-06 HIGH TEMPERATURE APPLICATIONS OF METALS. Metals and alloys with useful properties in the 1000° - $3000^{\circ}F$ range, often called refractory metals. Most articles are applications, for example cladding or plating for high temperature protection of substrate metals (as is done for turbine blades).

SIP-07 MATERIALS JOINING TECHNOLOGY. Joining of metallic materials by welding, brazing, soldering, fasteners, or structural adhesives. A few reports on adhesion of coatings or platings to substrates. A few articles on joining non-metallics.

SIP-08 MATERIAL FORMING AND MACHINING. Chemical milling, electric discharge machining, ultrasonic drilling and cutting, laser machining, lathe operations and electron beam machining. Forming techniques: explosive forming, magnetic forming, electrodeposition, and electrochemical forming, impact extrusion, forging. Numerical control.

SIP-09 STRUCTURAL ANALYSIS AND MECHANICAL PROPERTIES OF MATERIALS. Fatigue analysis, crack propagation, mechanical and thermal stress analysis, structural element design, and the effect of geometry, flaws and defects on structural properties. New materials and their properties applicable to structural design. Both metallic and non-metallic materials.

SIP-10 NON-DESTRUCTIVE TESTING. Inspection of materials for voids and flaws, weld testing and stress analysis. Testing of electronic circuits for physical flaws (hot junction detection by infrared monitors, etc.)

SIP-11 CORROSION AND PROTECTIVE COATINGS. All forms of metallic **corrosion**: galvanic corrosion, chemical corrosion, stress corrosion, etc. Corrosion detection and measurement. Materials testing for corrosion resistance. Most protective measures involve coatings. Non-metallic coatings, **both of** the organic and inorganic variety. Methods of applications, techniques of thickness measurement, and applied paint or coating chemistry.

SIP-13 BEARINGS AND LUBRICANTS. Design, testing and lubrication of bearings: gas bearings, roller and ball bearings, journal bearings and sleeve bearings. Wear or corrosion effects, fatigue effects, vibration effects, and stress analysis. All kinds of lubricants and methods of lubrication, including self-lubricating materials. Properties, testing, or applications of solid lubricants, greases, or oils. Effects of lubricants on materials.

SIP-15 FLUID FLOW. Subsonic flow, omitting supersonic flow reports and strictly aircraft-oriented studies. Both gaseous and liquid flow and occasionally two-phase flow. Hydraulic system flow, fluids with interesting rheological properties, fluid logic devices, and the effects of valves and restrictions.

SIP-16 HYDROCARBON FUELS AND COMBUSTION. Hydrocarbon-type fuels and their combustion. Fuel composition and blending; storage properties; contamination, sometimes by microorganisms; flow properties; combustion; and analysis of combustion products from air breathing engines.

SIP-17 AIR-WATER POLLUTION, AND INDUSTRIAL SAFETY. Pollution studies of industrial complexes (limited number). Other reports relevant to industrial pollution problems are selected from studies of space cabin atmospheres, astronaut drinking water systems, air and water filtration, clean room manufacturing environments, and toxicological testing. Safety and health hazards for technicians.

SIP-18 ANALYTICAL CHEMISTRY. Methods of chemical analysis: spectroscopy, NMR, ESR, nuclear activation analysis, chromatography, titration, colorimetry, polarography. Analysis for trace contaminents, gaseous impurities, or composition of materials (sometimes meteorites). Novel chemical sampling devices and techniques. Selections are for the analytical chemist.

SIP-19 REINFORCED PLASTICS. All aspects of reinforced plastics: preparation testing, stress analysis, environmental compatibility, and applications. Fiber reinforcement, filament winding, and lamination to form composite materials.

SIP-20 POLYMER TECHNOLOGY. All aspects of polymer technology not covered by SIP-19, REINFORCED PLASTICS. Application of polymers as adhesives, coatings, membranes, structural components, dielectrics, etc. Specification and testing of polymers. Polymerization - by all methods including radiation-induced, rheological studies, and polymer properties.

SIP-21 TEMPERATURE MEASUREMENT. Techniques and devices for temperature measurement: probes, thermocouples, thermistors, pyrometers. Extreme temperatures are more frequently analyzed. Errors in measurement and problems of data acquisition under difficult conditions.

SIP-22 VACUUM TECHNOLOGY. Equipment and materials used in vacuum work: pumps, switches, seals, gauges, and lubricants. Surface properties and other properties of materials in vacuum.

SIP-24 LASER DEVELOPMENTS. Applications of lasers: communications, data processing, displays, distance measurement, interferometry, machining, processing, optical radar, optical testing, surgery, probes and diagnostic instrumentation, velocity measurement, weapons effects and others. Highlights of advances in laser technology, surveys, state-of-the-art reports and bibliographies.

SIP-25 LASER RESEARCH. Together with SIP-24, this profile forms an exhaustive coverage of the reports on lasers. Technicalities of laser theory and practice: theoretical models and predictions of specific laser actions; predictions of optical effects, Q-spoiling techniques, population inversion, frequency modes, efficiencies, characteristics of rubies and other crystals, characteristics of gases used, selection of dopants, thermal distortion, rod preparation, etc.

SIP-27 LOGIC CIRCUITS. Electronic computation and control devices: gates, multipliers, adders, bi-stable circuits, trigger circuits, multivibrators, counters, clocks, and thin film or solid state components used. Many applications are for computers, but also miscellaneous control or monitoring systems.

SIP-28 INFRARED TECHNOLOGY. Instrumentation employing radiation in the infrared range. Transmission of infrared radiation, its detection, or the absorption/reflection spectra of various materials, thermography, spectroscopy, temperature measurement, non-destructive test equipment, and photography.

SIP-29 PHOTOGRAPHY. All types of cameras and photography: high-speed applications, oscilloscope cameras, infrared and other non-visible spectra methods, movies as well as still pictures, image formation, image resolution, films, lens systems, shutters and camera construction.

SIP-30 DISPLAY SYSTEMS. Cathode ray tubes to display information, man-machine interaction, image formation and enhancement, pattern recognition, color discrimination, image processing, laser writing, display system input/output modes, and specific applications. Electroluminescent materials. Non-CRT systems usually discuss data printing, xerography, fiber optics, electron optics, or various techniques for projection of maps from aerial photographs.

SIP-31 TELEMETRY. Transmission of data from inaccessible locations. Transmission of voice communications or verbal information is suppressed. Telemetry of data for industrial purposes, telemetry of monitored biological data, and telemetry of spacecraft navigational and experimental data. Data coding and decoding.

SIP-33 RECORDING SYSTEMS. All types of recording systems: audio, video and graphic. Storage of data rather than voice communications. Magnetic recording equipment, mechanical or roll-chart recorders, design and construction of recording equipment and applications.

SIP-34 SEMICONDUCTOR DEVICES AND MICROCIRCUIT FABRICATION. Miniaturized and integrated active circuit elements: circuit and component fabrication, encapsulation, packaging, testing, and highlights in R & D on semiconductor materials. Devices discussed: integrated circuits, monolithic circuits; hybrid circuits (i.e. all types of microcircuits); transistors, diodes; rectifiers; thin film devices; electroluminescent semiconductor devices (but not lasers and masers), and fabrication of logic circuits.

SIP-35 MICROWAVE SYSTEMS. Networks, transmission and reception, interference and shielding, antennas, relay systems, telephone systems, circuit design and components. Applications include radar (limited amount).

SIP-36 RADIO ANTENNAS, TRANSMISSION AND PROPAGATION. All wave lengths of transmission except microwave: attenuation, noise, reflection, antenna design, refraction, information theory, signal reception and related topics.

SIP-37 RADIO COMMUNICATION EQUIPMENT. Components of r.f. systems are emphasized: mixers, transceivers, transponders, receivers, amplifiers, modulators, demodulators, multivibrator systems.

SIP-40 COMPUTER PROGRAMS. An expansion of the same profile that ARAC uses to select abstracts for inclusion with our monthly mailing of the Computer Information Service: computer techniques and programs, programming systems, hybrid and digital computation, algorithms, special languages, computer linked displays, I/O routines, data editing and processing, etc.

SIP-42 ENVIRONMENTAL PHYSIOLOGY. Reactions of organisms to environmental conditions: reactions and adaptation to stress, decompression sickness, increased or decreased oxygen environment, weightlessness, and non-normal atmospheres. Preparation of man for unusual environments.

SIP-43 BIOMEDICAL TECHNOLOGY. Bioelectronics, biotelemetry, monitoring of biological functions, prosthetic devices, microscopic studies of organisms, biosimulation, models of biological systems, computer analysis of biosystems, waste and waste management. An equipment and instrument oriented profile.

SIP-44 NUCLEAR BIOLOGY. Effects of radiation on biological tissue, radio-protective agents, radiological diagnosis, radiation therapy, isotope analyses. Safety of humans in the presence of neutron, laser or microwave radiation.

SIP-45 TURBINE TECHNOLOGY. All reports dealing explicitly with turbines: axial compressors, fuels used, corrosion, regenerators, stress, blade design, vibration, acoustics, materials, and testing.

SIP-47 PHYSICAL CERAMICS. Crystalline structure, structural defects, dislocations, fractures, cracks, etc. Analysis techniques: electron microscopy, X-ray diffraction, fractography, petrography. Physical properties.

SIP-49 CONTROL SYSTEMS. Design and use of control systems: adaptive control, stability analysis, optimizing of systems, hydraulic systems, electrohydraulic systems, fluid amplification, switching systems, and applications of control systems.

SIP-52 SENSORY DEVICES FOR INSTRUMENTATION. Devices used to detect, observe or measure a physical property: transducers, thermocouples, potentiometers, force balance accelerometers, etc. Measurement of all types of physical properties or quantities.

SIP-60 SPACE-AGE ENERGY SOURCES. New types of energy sources: Fuel cells, batteries, solar cells, nuclear power sources, thermionic generators, direct conversion of nuclear or thermal energy to electricity.

SIP-63 INDUSTRIAL MATHEMATICS. Applied mathematics not including that specific to Operations Research; differential equations, applied complex variables, mathematical statistics, functional analysis, mathematical modeling, and numerical analysis. Applications are to engineering and physical sciences.

SIP-68 HEAT-TRANSFER. Conduction, convection and radiation, heat transfer coefficients, enthalpy, entropy, thermal effects on heat exchanger materials. Heat transfer in fluid flow, analysis of heat transfer, measurement of heat flux, and methods for heat flow calculations.

SIP-70 HOLOGRAPHY. Applications and state-of-the-art in this new field: Imaging, filtering, resolution, aberation, coherence effects, ray tracing, magnification, and reconstruction. Applications: interferometry, vibration analysis, flow analysis, and plasma diagnostics.

SIP-71 HUMAN FACTORS ENGINEERING. Emphasis is on engineering design to fit the physical and psychological capabilities of man. Man-machine inter- action, prediction of human performance, human response in a control system, etc.

J

Joining of materials, SIP-07
Journal bearings, SIP-13

K

Klystron tube, SIP-35

L

LaPlace transforms, SIP-63
Laser, SIP-24, SIP-25
Laser, applications of, SIP-24
Laser theory, SIP-25
Laser machining, SIP-08, SIP-24
Laser photography, SIP-24, SIP-70
Latent heat, SIP-68
Leak testing, SIP-10
Life sciences, SIP-42, SIP-43, SIP-44,
      SIP-71
Life support systems, SIP-42
Liquefaction of gases, SIP-26
Liquid Oxygen (LOX), SIP-26
Linear functions, SIP-63
Logic circuits, SIP-27, SIP-34
Low pressures, SIP-22, SIP-26
Low temperatures, SIP-26
Lubrication, SIP-13

M

Machining, SIP-08
Magnetic recording system, SIP-33
Man-machine interaction, SIP-71
Manometers, SIP-52
Maser, SIP-24, SIP-25
Mass flow rate, SIP-15
Mass spectrometry, SIP-18
Material forming, SIP-08
Mathematics, SIP-63
Matrix algebra, SIP-63
Mechanical recorders, SIP-33
Medical diagnosis, SIP-43, SIP-44
Medical instrumentation, SIP-43
Memory units (small), SIP-27
Metal, microstructure, SIP-04
Metal reinforcement, SIP-01
Metallurgy, SIP-04, SIP-05, SIP-06
Metal working, SIP-08
Microcircuit interconnections, SIP-34
Microelectronic fabrication, SIP-34

Micrography, SIP-04
Microwave equipment, SIP-35
Microwave systems, SIP-35
Microwave transmission, SIP-35
Modulation, SIP-31, SIP-36, SIP-37
Monolithic circuits, SIP-34
Multi-audio-video tape recording,
      SIP-33
Multiprocessor computer systems,
      SIP-27

N

Nickel, SIP-04
Nickel alloys, SIP-06
Non-destructive testing, SIP-10,
      SIP-07
Non-Newtonian Flow, SIP-15, SIP-20
Numerical analysis, SIP-63
Numerically controlled machining,
      SIP-08
Numerically controlled machines, SIP-27

O

Oil, SIP-13
On-line computer programs, SIP-40
Optical communications, SIP-24
Optical radar, SIP-24
Optical test equipment, SIP-10
Optimal control, SIP-49
Optoelectronic materials, SIP-34
Organic semiconductors, SIP-34

P

Packaging (electronic), SIP-34
Paints, SIP-11
Partial differential equation, SIP-63
Pattern recognition, SIP-30
Phased array antennas, SIP-36
Phosphorescent materials, SIP-30
Photography, SIP-29
Photographic data processing,
      SIP-29
Photographic instrumentation,
      SIP-29
Photomap production, SIP-29
Plastics, SIP-19, SIP-20
Plating, SIP-07

N67-29672# Advisory Group for Aerospace Research and Development, Paris (France)

ON THE STUDY OF THE AMPLITUDE OF THE RADIOELECTRIC COURSE OF A SATELLITE AT THE HORIZON OF THE STATION [SUR L'ETUDE DE L'AMPLITUDE DU CHAMP RADIOELECTRIQUE D'UN SATELLITE A L'HORIZON DE LA STATION]

J. F. Aurejac (Paris Univ.) and J. Papet-Lepine 1966 32 p In FRENCH, ENGLISH summary
(AGARD-553) CFSTI HC $3.00/MF $0.65

Using a 40 Mc/s high gain aerial, which can be pointed in all directions of azimuth, the Val-Joyeux station can receive signals from Explorer 22 satellite for all revolutions from 330° to 206° of longitude W when passing over the equator. In extreme cases this represents a distance between the satellite and the observer which is sometimes more than 5.000 km. Because of a very long journey in the ionosphere, it is possible to show a considerable increase in the refraction effects and in the effect of irregularities in the distribution of the electron density in the environment traversed. Thus a large increase in scintillations is observed when the angle of elevation is approximately 20° or less.

This increase in scintillations is particularly noticeable towards the north, but also towards the south. In the latter case some correlation between magnetic activity and the scintillation coefficients has been observed. A systematic comparision with the results obtained by other stations is then made to define the areas giving rise to such scintillations. Author

N67-29574# Naval Research Lab., Washington, D. C.
AIRBORNE INSTRUMENTS FOR TRACER STUDIES IN CLOUDS
E. C. Jones, C. M. Gordon, R. E. Leighton, and J. I. Hoover In its Rept. of NRL Progr. Feb. 1967 p 1-7 refs (See N67-29573 16-34)

An airborne instrument system has been developed to disperse, locate and collect a tracer material for application to cloud physics studies. After collection, the samples are analyzed by neutron activation to detect small amounts of the tracer, in this case indium, that has been dispersed in clouds. The results of the tests indicate that the method shows much promise for future cloud physics studies. Author

APPENDIX E

Exhibits Relative to

Management Science Service

THE MANAGEMENT SCIENCE SERVICE: STATUS OF THE EXPERIMENT

This is the sixth bi-monthly mailing of this experimental service, and the overall response has been good. More persons than expected have asked to receive the profiles, and we have appreciated the returns we have received from the evaluation forms we included with the first four mailings. These allowed us to make needed changes in the profiles, as are reflected by the more detailed descriptions now being included with the mailings.

With this mailing we are including the major evaluation questionnaire of this experiment, and intentions are to have only one or two brief questionnaires during the continuation of the experiment. The present evaluation form is in two parts; one a general evaluation of the overall service, the other an evaluation of each individual profile. We would appreciate each recipient completing one of the general evaluation forms, and also individual profile evaluation forms for each of the profiles being received. Please remember that we are trying to make this your service, and we encourage you to be candidly critical. Suggestions for improvements will be welcomed.

Document orders: There seems to be some misunderstanding on this. "N" prefixed documents and "AD" prefixed documents are available to you from ARAC free of charge during the experimental period.

MANAGEMENT SCIENCE SERVICE

GENERAL EVALUATION

NAME:_____ COMPANY:_____

POSITION/TITLE:_____

UNIT/DEPARTMENT:_____

1. How would you rate the overall content of information received from the Management Science Service?

   Excellent_____ Good_____ Fair_____ Poor_____ Unsatisfactory_____

2. Why do you want to receive information related to Management Science?

   _____

   _____

3. What other sources of information on Management Science do you use?

   Company library_____   Reference books or texts_____
   Professional societies_____   Journals_____
   Company reports_____   Other_____

4. How to you compare the information received from the Management Science Service with these other sources?

   Better quality_____   Too theoretical_____
   Poorer quality_____   Of limited application_____
   Too different to compare_____ Other_____
   Too space oriented_____   _____

5. How frequently would you like to receive the mailings?

   Every two weeks_____   Once a month_____   Other_____

6. Comments and suggestions:

   _____

   _____

   _____

   _____

   _____

   _____

   _____

MANAGEMENT SCIENCE SERVICE

INDIVIDUAL PROFILE EVALUATION

NAME:_____ SIP_____

1. What sub-topics in the area of this profile are of maximum interest to you?

   _____

   _____

2. How would you compare your definition of the subjects of this profile with the reports being cited? (See the ARAC description in front of the abstracts.)

   _____

   _____

3. Sub-topics now being covered in the profile which are:

   Of Maximum Interest   Of Minimum Interest

   _____   _____

   _____   _____

   _____   _____

4. If abstracts of articles in current issues of open literature journals or magazines were included with this profile, please name the journals which you would most like to have included:

   _____   _____

   _____   _____

   _____   _____

5. Do the abstracts themselves provide information of value?

   High_____   Low_____   Medium Value_____

6. Have you received any reports which have been of specific value to you? Please comment:

   _____

   _____

7. Comments and suggestions:

   _____

   _____

MANAGEMENT SCIENCE SERVICE
August 10, 1967

This new service has been received very well by industry so far, but it is very important to emphasize that this program is currently **experimental.** The profiles are subject to change, and the definitions of them have been substantially revised in several cases.

Currently there are eight profiles in the service:

       SIP-38   QUALITY CONTROL & RELIABILITY
       SIP-39   OPERATIONS RESEARCH
       SIP-41   PERSONNEL MANAGEMENT -- BEHAVIORAL SCIENCES
       SIP-46   INFORMATION SYSTEMS
       SIP-53   ECONOMIC PLANNING & COST ANALYSIS
       SIP-55   PRODUCTION AND MATERIALS MANAGEMENT
       SIP-56   RESEARCH & ENGINEERING ADMINISTRATION
       SIP-72   COMPUTER SOFTWARE

Detailed descriptions of these profiles as they are now being serviced are attached.

The literature base being used for the service includes USGRDR as well as STAR/IAA. So far considerable variance in volume of reports from issue to issue has been observed for some of the profiles. Also some of the defined areas being covered in the profiles overlap a bit, i.e. there is some redundancy in reports being cited in the various profiles, and this effect seems more pronounced than it is for our "regular" SIP's.

Three of the MSS profiles have been assigned an experimental label for the duration of the experiment only. When the experiment is complete, SIP-38, 39 and 41 will revert to a regular SIP profile status, probably with revised and improved coverage. As for the ultimate fate of the other profiles, "very cautious optimism" is the word to use.

The main questionnaire of the experiment has just been mailed out so that it has become late for interested persons to be included in that. We are not eager to sign up more MSS participants until the experiment shows whether the product is going to have some quality to it. However, people can still sign on for it if they insist.

The major areas within this profile are classified as Product Reliability, Industrial Quality Control, and Reliability & Quality Control Management. Specific topics to be included with each of these subject areas are listed below:

A. Product Reliability

   Product Assurance
   Performance Characteristics
   Life Prediction
   System Reliability
   Failure Analysis
   Product Design
   Accelerated Testing
   Reliability Models
   Statistical Distributions
      (e.g. Weibull, Exponential)

B. Industrial Quality Control

   Inspection Methods
   Process Inspection & Control
   Production Test Equipment
      (Applications, Procedures, &
      Devices)
   Statistical Methods
      (e.g. Sampling Plans, Control
      Charts)

C. Rel. & Q.C. Management

   Project Quality Performance
   Reliability Specifications and Procedures
   Reliability & Quality Assurance Plans and
      Programs
   Quality Reporting Systems
   Motivation in Q. C. Programs (Zero Defects
      Programs, etc.)

Due to the wide nature & level of topics covered, it should be of interest to the manager as well as the specialist. The majority of abstracts will be found in the area of Product Reliability -- related to either the reliability of complete systems or specific electronic components or assemblies.

"Operations Research" is defined as consisting of various quantitative or analytical techniques and approaches required to formulate and solve problems of interest to management. This profile will contain a high percentage of reports requiring advanced knowledge in the understanding and application of mathematical techniques.

A. Established Operations Research Methods & Quantitative Techniques

Monte Carlo Methods
Queuing Theory
Programming (Linear, Non-Linear, Dynamic, Integer)
Simulation
Markov Processes
Decision Theory
Game Theory
Maximization or minimization techniques
Mathematical modeling
Linear Algebra
Optimization Techniques
Stochastic Processes
Sequential Analysis
Bayesian Analysis
Matrix Algebra
Sensitivity Analysis

B. Management Problem Areas -- Examples of Application of Quantitative Approaches

Forecasting	Inventory Control	Marketing
Scheduling	Distribution	
General Allocation of Resources Problems		

The majority of reports found will belong in the first category, discussions of established quantitative tools. However, each issue usually contains a few reports in Category B also, and while many of these same reports appear in other Management Science Profiles, examples of more advanced analyses will be included here. The profile is intended for the specialist in Operations Research.

PERSONNEL MANAGEMENT - BEHAVIORAL SCIENCES   (SIP-41)

This profile is designed to include reports covering the behavioral

sciences (i.e. psychology, social psychology, sociology, and industrial

psychology). A somewhat smaller number of reports specifically related to

Personnel Management will be included also. Topic areas:

A. Behavioral Science

Group Dynamics
Task Satisfaction vs. Performance
Interpersonnel Relations
Theory of Formal Organizations
Motivation
Human-Problem Solving
Decision-Making Behavior
Communication Networks
Perception
Leadership
Cultural Adaptations

B. Personnel Management

1. Job Analysis
Task Rating
Task Evaluation
Human Factors

2. Training
Programmed Instruction
Computer Assisted Instruction
Training Models - Training Effectiveness
Teaching Methods

3. Other Personnel Functions

Since many abstracts are related to behavioral science, this profile

should also be of interest to individuals concerned with understanding and

influencing the performance of individuals or groups within an organization.

Many of the behavioral science reports are based on research currently being

conducted at major universities.

A. <u>Information</u> <u>Storage</u> <u>&</u> <u>Retrieval</u> <u>Applications</u>

    1. Data Management
    2. Data Storage Systems
    3. Documentation
       a. Indexing Systems
       b. Library Science
       c. Information Classification & Dissemination

B. <u>Management</u> <u>Information</u> <u>Systems</u>

    1. Decision-making Aids
    2. Data Processing Applications
    3. Systems & Procedures

This profile is intended to cite reports of interest to persons
engaged in relating the information needs of an organization to the
design, implementation or operation of an information system. Emphasis
on the use of computers in information systems is not intended, but by the
nature of the work being reported, many reports discuss computer applications
and techniques for information retrieval. A lesser volume of reports is
concerned with data processing and use for managerial decision-making.

ECONOMIC PLANNING & COST ANALYSIS (SIP-53)

The majority of reports cited will concern long-range planning methodologies as represented by the topical areas listed. Reports on cost or financial analysis of current projects will also be included.

A. Management Planning Methods   B. Financial & Cost Analysis

Long-range Forecasting   Capital Budgeting
Systems Analysis Applications   Program Cost Performance
Cost-benefit Analysis   Financial Models
Cost-effectiveness   Value Engineering
Planning-Programming-Budgeting   Value Analysis
Project & Program Scheduling   Cost Measurement Methods
Economic Evaluation of Projects
    & Programs

This profile should be of interest to individuals concerned with such activities as long-range planning, research and development planning, cost or budgeting activities and investment analysis. However, the number of available reports in these areas will be limited.

PRODUCTION AND MATERIALS MANAGEMENT (SIP-55)*

A. <u>Production</u> <u>Control</u>

   Inventory Control Methods & Procedures
   Scheduling Systems
   Production Planning
   Production Forecasting

B. <u>Manufacturing</u> <u>Engineering</u>

   Safety Design
   Process Design
   Methods Improvement
   Mechanization
   Maintenance

C. <u>Logistics</u>

   Distribution
   Traffic Management
   Warehousing

D. <u>Materials Packaging & Handling</u>

   Fasteners
   Containers
   Packing Standards
   Specifications
   Storage Racks, Conveyors, Pallet Design

This profile will cover the planning and control activities of production management as well as the technically-oriented areas of materials handling and manufacturing engineering. It should be of interest to both line & staff personnel who are concerned with these activities. Advanced analytical techniques in these areas will be included in the "Operations Research" profile.

*(As of this mailing, the two Management Science Profiles entitled "Production Control & Manufacturer Engineering" and "Logistics and Distribution Analysis" have been combined into one profile entitled "Production and Materials Management." This change resulted from the overlap in both subject matter and market interest. The present profile will cover the same subject areas as the two preceding profiles.)

A.   Management of Projects

Allocation of Resources Among R & D Projects
Interface Management (Between Multiple Organizations on the Same Project).
Configuration Management (e.g. Management of Engineering Changes)
Development of Project Time Schedules (e.g. Trend Line Analysis)
Contract Administration
Milestone Techniques (e.g. PERT, CPM)
Technical Forecasting

B.   Management of Scientists & Engineers

Organizational Problems in R&D
Information Channels in R&D
Innovation & Creativity
Personnel Management in R&D Environment

This profile is oriented toward the manager, particularly in the

area of research and development, but due to the scope of project manage-

ment, it should be of interest to individuals in other areas as well. The

focus of the profile is on implementation of plans and programs, and in

selecting reports the operating manager's interests are kept in mind.

COMPUTER SOFTWARE   (SIP-72)

The general purpose of this profile is to include reports related to current and future trends in the application of computers to management problems.   Computer programs and reports related to applications in the physical sciences will be suppressed.

A.   Software Development

    Computer Programming
    Programming Languages
    Multiprogramming Systems
    On-line Systems
    Real Time

B.   Computer Applications

    Solution of Mathematical Methods (techniques) for Management Science
    Computer Assisted Instruction
    Management Decision Systems
    Electronic Data Processing (Occasional Reports)

C.   General Interest

    New Developments in Computers (e.g. all-optical computers)
    Security in Computer Environment
    Cost Study of Computer Implementation

Although this profile is designed for individuals either working in the area of computer programming or knowledgeable about the area, the emphasis on computer applications (e.g. the solution of various mathematical techniques) may make it of interest to other individuals as well.   Reports related to computer hardware design or application will be suppressed.

Evaluation of Management Science Service - Profile: _____

Mailing: _____

1. Approximately what per centage of abstracts were relevant?

    All_____   3/4_____   1/2_____   1/4_____   None_____

2. After reviewing the description of this SIP profile (located at the front of the booklet), in general do the abstracts contained in this mailing fit with your own interpretation of the area?

    Yes_____   No_____   In Part_____

3. Did the relevant abstracts discuss:

    a. information of general interest_____
    b. information directly applicable to your work_____
    c. solution to a current problem_____
    d. information of personal interest_____
    e. other (list)_____

4. On what basis did you determine which abstracts were of little interest? (check more than one if applicable)

    a. subject unrelated to present work activities_____
    b. too elementary_____
    c. have seen the same or similar material previously_____
    d. not enough time to consider the subject_____
    e. other_____

5. How would you rank (1,2 or 3) the different sources of abstracts (distinguished by the prefix letter in the abstract number) according to their relevancy?

    N-_____   AD- & PB-_____   A-_____

6. What were the 2 or 3 most relevant and least relevant abstracts in this mailing:

    Most Relevant   Least Relevant

    _____   _____
    _____   _____
    _____   _____

7. How many reports did you order from this profile? _____

8. Other comments or suggestions:

Name: _____   Date: _____

Company: _____   Telephone: _____

Return envelope is provided for your convenience.

APPENDIX F

Exhibits Relative to the

Use Audit Project

INSTRUCTIONS FOR COMPLETING THE

"INFORMATION TRANSFER ANALYSIS" INTERVIEW FORM

1. The form should be filled out for each individual interviewed rather than in a group session. Naturally, if you meet with eight to ten people at a particular location, we do not expect a form for each. Pick a representative sample based on service usage.

2. Be sure to determine the channels through which ARAC services ultimately reach the user (via library, direct through ARAC coordinator, etc.) and note this in your trip report.

3. The questions marked with an # are the most important. We want answers to all questions, but the marked questions deserve a higher proportion of time.

4. Prepare yourself for each visit by developing a history of service usage and volume at the location of your visit.

5. Use the back of the form for any additional information obtained from the discussion that may be relevant.

6. We want the information from the ultimate users of our services whenever possible. In certain cases you may not be able to do this. Indicate at the top of page one "yes" or "no" regarding the ultimate user.

7. After you complete an interview take a few minutes to go over each question and fill in details you missed during the discussion.

INFORMATION TRANSFER ANALYSIS FORM

Investigator_____   Individual_____

Company _____   Title_____

Location_____   Work Responsibility_____.

Date_____   Ultimate User (Yes,No)_____

// 1. What sources do you use in obtaining scientific and technical information:

Use Made of Information
Rank in importance (1,2,3)

Check	% Time spent using.		Problem Solving	Current Awareness	Idea Generation
____	____	PAID CONSULTANTS	____	____	____
____	____	LIBRARIES AND JOURNALS	____	____	____
____	____	INFORMATION SERVICES	____	____	____
____	____	PROFESSIONAL MEETINGS	____	____	____
____	____	CUSTOMERS	____	____	____
____	____	SUPPLIERS REPRESENTATIVES	____	____	____
____	____	SUPPLIERS LITERATURE	____	____	____
____	____	ASSOCIATES	____	____	____
____	____	OTHER _____	____	____	____
____	____		____	____	____

// 2. When do you seek information from special sources (defined here as a
source of information operated by professionals;for example, libraries,
ARAC, information systems operated by trade associations, etc.)
(check as many as apply)

_____ When I do not know where to go.
_____ When I have enough time to do so.
_____ When I am unfamiliar with the technical area.
_____ Only when I think the persons providing the special assistance
        understand my problem or area of interest.
_____ Other. Please list or comment:

Use Made of Information:
Rank in Importance (1,2,3)

// 3. Value of ARAC services:

	Used?	Value* Rating	Problem Solving	Current Awareness	Idea Generation
RETROSPECTIVE SEARCH SERVICE	____	____	____	____	____
CUSTOM INTEREST PROFILES	____	____	____	____	____
STANDARD INTEREST PROFILES	____	____	____	____	____
INDUSTRIAL APPLICATIONS SERVICE	____	____	____	____	____
MARKETING INFORMATION SERVICE	____	____	____	____	____
COMPUTER INFORMATION SERVICE	____	____	____	____	____
Documents	____	____	____	____	____

*Rate as 1, 2 or 3 (hi, medium, or low)
Q: How valuable is the service to you?

// 4. Are the mechanics of ARAC service effective? (Check as many as apply)

_____ Visits by the ARAC staff not frequent enough.
_____ ARAC staff does not understand my needs.
_____ Use of ARAC services takes up too much of my time.
_____ Too much time delay in getting the information.
_____ Must review too much information to identify the limited amount applicable.
_____ Never did understand the various services and how to obtain them.
_____ Other

// 5. What was the basis for selecting the services you are now using:
(Check as many as apply)

_____ Suggested by someone else in the company.
_____ Description of services in literature.
_____ Cost of service.
_____ Suggestion of ARAC staff member.
_____ Other.

// 6. Is the information provided relevant to your needs:
(Check as many as apply)

For Which ARAC Services

_____ Too theoretical.   _____
_____ Too general.   _____
_____ Costs too much to apply it. _____
_____ Don't have time to apply it. _____
_____ Other (list)   _____

7. What is the typical time span from receipt of ARAC information until its contribution results in a new product or process in your company:

_____ less than 20 days   _____ 6 months to 1 year
_____ 30 to 180 days   _____ over 1 year

8. Role that information plays in your work:

_____ % of your time spent in information seeking.
_____ Can you usually establish the contribution of information inputs to your work?
_____ Do your associates frequently consult you for information or information sources?

// 9. What improvements would you like to see made in ARAC services? Comment.

10. Can you think of some specific examples of new technology obtained externally in the past year?

<u>Source</u>   <u>Describe what happened.</u>

11. How do you gain access to externally generated technology.

VISIT PLANS

Diamond Alkali	Painesville Ohio	Bernardon
B. F. Goodrich	Brechsville, & Akron Ohio	"
General Tire	Akron Ohio	"
Harshaw Chemical	Cleveland Ohio	"
Harris Intertype	Cleveland Ohio	"
Link Belt	Cedar Rapids Iowa	Mullis
Cities Service	Tulsa Oklahoma	"
Kerr-McGee	Oklahoma City	"
~~Mobil Oil~~	Dallas Texas	"
~~U. S. Brass~~	~~Plano Texas~~	~~"~~
Skelly Oil	Tulsa Oklahoma	"
Air Preheater	Wellsville N. Y.	DiSalvo
Coats & Clark	Union N. J.	"
Mobil Oil	Paulsboro, & Princeton N. J.	"
Sarkes Tarzian	Pennsauken N. J.	"
Consolidated Papers	Wisconsin Rapids Wisconsin	Hoffman
Kimberly-Clark	Neenah Wisconsin	"
Sun Oil Company	Marcus Hook Pennsylvania	Page
Sun Oil Company	Philadelphia Pennsylvania	"
Westinghouse	Pittsburgh Pennsylvania	Page & Lundgren
Western Electric	New York N. Y.	Page
R. C. A.	Sommerville N. J.	Lundgren
"	Princeton N. J.	"
"	Camden N. J.	"
"	Gibbsboro N. J.	"
"	New York N. Y.	"
Harris Intertype	Brooklyn N. Y.	"
Carborundum	Niagra Falls N. Y.	Snow
Carborundum	Sanborn N. Y.	"
General Electric	Schenectady N. Y.	"
Union Carbide	Tarrytown N. Y.	"
"	Tuxido N. Y.	"
"	Tonawanda N. Y.	"
Arvin	Dayton Ohio	Binder
Cincinnati Mill	Cincinnati Ohio	"
Welco	Cincinnati Ohio	"
Internation Harvester	Chicago Illinois	Blevins
Michle/Coss/Dexter	"	"
Calumet Coach Co.	"	"
Inst. of Gas Technology	"	"
Scully International	Downers Grove Illinois	"
Northern Illinois Gas	Aurora Illinois	"

Abbott Labs	North Chicago Illinois	Hall
Streeter-Amet	Grayslake Illinois	"
Andrew Corporation	Chicago Illinois	"
Sinclair Research	Harvey Illinois	"
Ordnance Eng. Ass.	Chicago Illinois	"
Tower Oil	"	"
Link-Belt	"	"
Borg-Warner	Des Plaines Illinois	Mucha
Nuclear-Chicago	"	"
International Harvester	Melrose Park Illinois	"
Pollack & Skan	Chicago Illinois	"
Powers Regulator	Shokie Illinois	"
Weber-Valentine Co.	Elk Grove Village Illinois	"
I. L. C. Industries	Chicago Illinois	"
James Electronics	Chicago Illinois	"

APPENDIX G

Exhibits Relative to Research in Automatic

Maintenance of Current Awareness Profiles

```
          PROGRAM FEEDBACK
          COMMON INC,NAME1,NAME2,ICUTNO,ICUTWT
          DIMENSION ICC(40)
          DIMENSION MCAT(35),NCAT(35)
          DIMENSION IMT(200)
          DIMENSION INRD(370),IRD(300),ICT(250),ITAL(100)
          DIMENSION INFU(200)
          DIMENSION IBUF(400)
          DIMENSION KCK(20)
          DIMENSION IBUFO(400)
          DIMENSION ITAB(7)
          DIMENSION JTAL(100)
          DIMENSION JCT(250)
          DIMENSION NWT(100)
          DIMENSION INEX(1000)
          DIMENSION ITERMS(1000)
          ISIG=0
          INDIC=1
          NR=5100000000000000B
          NT=6300000000000000B
          NN=4500000000000000B
          ITAB(1)=7700000000000000B
          ITAB(2)=7777000000000000B
          ITAB(3)=7777770000000000B
          ITAB(4)=7777777700000000B
          ITAB(5)=7777777770000000B
          ITAB(6)=7777777777700000B
          ITAB(7)=7777777777777700B
          IF=7700B
          IFF=77B
          IIB=60B
          IIR=61B
          IIT=63B
          IIC=23B
          IIS=62B
          BUFFER IN (60,0)(IRD(1),IRD(10))
9710      IF(UNIT,60) 9710,9712,9711,9714
9712      IRDC=IRD(1).AND.7700000000000000B
          DO 1771 JJ=1,1000
1771      INEX(JJ)=0
          DO 744 JJ=1,40
744       ICC(JJ)=6060606060606060B
          DO 453 JJ=1,34
          MCAT(JJ)=0
453       MCAT(JJ)=0
          INR=0
          IR=0
          IWC=0
          II=0
          IB=0
          ITC=0
          IND=0
          IPD=0
          N=0
          IFIR=0
          IPB=1
```

```
      IF(IRDC.EQ.NR) 9811,9812
9812  WRITEOUTPUTTAPE 61,9814
9814  FORMAT(2X,*EITHER THE INPUT IS NOT IN THE PROPER ORDER OR A CONTRO
     1L LETTER IS INCORRECT*)
9711  CALL EXIT
9714  WRITEOUTPUTTAPE 61,9713
9713  FORMAT(2X,*PARITY ERROR ON READING INPUT*)
      CALL EXIT
9811  DO 9902 JR=1,10
      IF(IRD(IR+JR)-60606060606060606060B) 9810,9911,9810
9810  IRD(IR+JR)=IRD(IR+JR).AND.777777777777B
      IRD(IR+JR)=IRD(IR+JR).OR.060700000000000000B
9902  CONTINUE
9911  IR=IR+(JR-1)
9912  BUFFER IN(60,0)(IRD(IR+1),IRD(IR+10))
9715  IF(UNIT,60) 9715,9716,9711,9714
9716  IRDC=IRD(IR+1).AND.770000000000000000B
9913  IF(IRDC.EQ.NN) 9914,9312
9312  IF(IRDC.EQ.NR) 9811,9812
9914  DO 9915 JNR=1,10
9915  INRD(INR+JNR)=IRD(IR+JNR)
9916  DO 9920 JNR=1,10
      IF(INRD(INR+JNR)-60606060606060606060B) 9917,9918,9917
9917  INRD(INR+JNR)=INRD(INR+JNR).AND.777777777777B
      INRD(INR+JNR)=INRD(INR+JNR).OR.060700000000000000B
9920  CONTINUE
9918  INR=INR+(JNR-1)
9919  BUFFER IN (60,0)(INRD(INR+1),INRD(INR+10))
9719  IF(UNIT,60) 9719,9720,9711,9714
9720  INRDC=INRD(INR+1).AND.770000000000000000B
      IF(INRDC.EQ.NN) 9916,9921
9921  IF(INRDC.EQ.NT) 9922,9812
9922  DO 9923 JNR=1,10
9923  INFO(JNR)=INRD(INR+JNR)
      CALL SORT(IRD(1),IRD(IR),1,1,0,1)
      CALL SORT(INRD(1),INRD(INR),1,1,0,1)
      DO 90 JK=1,100
90    ITAL(JK)=0
903   DECODE(28,20,INFO(1)) IT,INC,ICUTWT,ICUTNO,NAME1,NAME2
20    FORMAT(R1,R5,I2,1X,I3,2A8)
      WRITEOUTPUTTAPE 61,335
335   FORMAT(1H1)
      WRITE(61,376) INC,NAME1,NAME2,ICUTNO,ICUTWT
376   FORMAT(2X,*INTEREST CENTER-*,R5,10X,*STAFF MEMBER-*,2A8,4X,*CUT OF
     1F NO.-*,I3,4X,*CUTOFF WT.-*,I2)
      WRITEOUTPUTTAPE 61,378
378   FORMAT(////,2X,*THE FOLLOWING DOCUMENTS WERE TAKEN AS RELEVANT*)
      WRITEOUTPUTTAPE 61,377,(IRD(IRR),IRR=1,IR)
      WRITEOUTPUTTAPE 61,379
379   FORMAT(////,2X,*THE FOLLOWING DOCUMENTS WERE TAKEN AS NON RELEVANT
     1*)
377   FORMAT(2X,4(2X,A8))
      WRITEOUTPUTTAPE 61,377,(INRD(IRR),IRR=1,INR)
      IF(IT-IIT) 21,22,21
21    WRITEOUTPUTTAPE 61,101
101   FORMAT(2X,*NO T CARD*)
```

```
          ITC=ITC+6
          GO TO 22
400       IF(UNIT-1) 400,432,432
432       BUFFER IN (1,0)(IBUF(1),IBUF(400))
401       IF(UNIT-1) 401,402,600,402
402       L=LENGTHF(1)
          IB=0
404       ICNT=1
          IF(IB-L) 405,400,400
405       GO TO (424,704) IPR
424       IF(IRD(II+1)-IBUF(IB+1)) 705,706,705
704       IF(INRD(II+1)-IBUF(IB+1)) 705,706,705
705       IC=IBUF(IB+2).AND.IF
          IFIN=0
          IC=(IC/64)*10
          ICP=IBUF(IB+2).AND.IFF
          IPP=(ICP+IC)*2+2
          IBZ=IB
          IB=IB+IPP
          GO TO 404
706       IC=IBUF(IB+2).AND.IF
          IFIN=0
          IC=(IC/64)*10
          ICP=IBUF(IB+2).AND.IFF
          IPDZ=(IC+ICP)*2+2
          IBZ=IB
          IB=IB+IPDZ
          II=II+1
712       FORMAT(2X,A8,3(2X,I4))
          DO 500 INN=1,IPDZ
500       IBUFO(INN)=IBUF(IBZ+INN)
          DECODE(4,804,IBUFO(2)) INDEX
804       FORMAT(2X,I2)
          NCAT(INDEX)=NCAT(INDEX)+1
          INN=INN-1
          K=INN-2
403       IFIN=IFIN+1
          IF(2*IFIN-ITOT) 501,404,404
501       CALL MATCH(K,IFIN,ICT,IBUFO,ITAL,ITAB,IMT,INEX,ITERMS,JEX,ICNT)
          GO TO 403
600       REWIND1
          GO TO (602,601) IPR
602       IPR=2
          CALL SORT (INEX(1),INEX(2*JEX-1),2,1,1,1)
          WRITE (61,1000)
1000      FORMAT(1H1)
          WRITE(61,1001)
1001      FORMAT(2X,*THE FOLLOWING TERMS WERE FOUND IN THE  RELEVANT DOCUMEN
         1TS  *)
          DO 1003 JJ=1,JEX
          IDX=INEX(2*JJ)
          IDY=INEX(2*JJ-1)
          IDTR=ITERMS(2*IDX-1)
          IDTRP=ITERMS(2*IDX)
1003      WRITE(61,1002)(IDTR,IDTRP,IDY)
1002      FORMAT(2X,2A8,6X,I4)
```

```
        CALL EXIT
  22    BUFFER IN(60,0) (INFO(1),INFO(10))
  202   IF(UNIT,60) 202,201,1999
  201   DECODE(1,30,INFO(1))IS
  30    FORMAT(R1)
        IF(IS-IIC) 31,222,31
  222   DO 292 JJ=1,10
  292   ICC(JJ)=INFO(JJ)
        ISIG=1
        GO TO 22
  31    IF(IS-IIS) 33,32,33
  33    IF(IS-IIR) 34,32,34
  34    IF(IS-IIP) 734,700,734
  700   INDIC=2
        ITOT=ITC+1
        GO TO 400
  734   WRITEOUTPUTTAPE 61,102
  102   FORMAT(2X,*INPUT PROFILE DISORDERED*)
        CALL EXIT
  32    ITCP=ITC+1
        ITCF=ITC+6
        NTCP=(IIC+2)/2
        NTCF=(IIC+7)/2
        DECODE(44,336,INFO(1))(NWT(NDD),NDD=NTCP,NTCF)
  336   FORMAT(6X,I2,16X,I2,16X,I2)
        DECODE(60,103,INFO(1))(ICT(ND),ND=ITCP,ITCF)
  103   FORMAT(6X,3(2X,2A8))
        DO 993 JT=ITCP,ITCF
  993   JCT(JT)=ICT(JT)
  801   ICK=IIC+1
        IF(ICT(ICK)-6060606050606060608) 891,999,891
  999   IICK=ICK.AND.1R
        IF(IICK) 1999,899,1999
  1999  ITOT=ICK
        GO TO 400
  891   IF(ICT(ICK)-6060606050606060608) 899,999,899
  899   DECODE(16,777,ICT(ICK))(KCK(IK),IK=1,16)
  777   FORMAT(16(R1))
  780   IF(IWC-16) 791,800,800
  791   IWC=IWC+1
        IF(KCK(IWC)-60R) 779,778,779
  778   KCK(IWC)=0
        GO TO 780
  779   IF(KCK(IWC)-54R) 780,781,780
  781   DO 790 IKC=IWC,16
  790   KCK(IKC)=0
        IWC=IWC-1
  800   ENCODE(16,799,ICT(ICK))(KCK(KL),KL=1,16)
        IF(IWC-16) 5002,5003,5003
  5002  ICT(ICK+1)=ICT(ICK+1).OR.IWC
  5003  IWC=0
  799   FORMAT(16R1)
        IF(ICK-ITC-5) 892,802,802
  892   ICK=ICK+2
        GO TO 891
  802   ICK=0
```

```
      IOT=(ITOT-1)/2
      II=0
      IB=0
      DO 433   JJ=1,34
      MCAT(JJ)=NCAT(JJ)
433   NCAT(JJ)=0
      DO 533 JJ=1,100
      JTAL(JJ)=ITAL(JJ)
533   ITAL(JJ)=0
      DO 593 JJ=1,1000
593   INEX(JJ)=0
      GO TO 439
601   WRITEOUTPUTTAPE 61,335
      WRITE(61,376) INC,NAME1,NAME2,ICUTNO,ICUTWT
      WRITEOUTPUTTAPE 61,334
7000  FORMAT(2X,10(2X,A8))
334   FORMAT(25X,*REL.*,2X,*NON REL.*,22X,*REL.*,2X,*NON REL.*,22X,*REL.
     1*,2X,*NON REL.*)
      WRITEOUTPUTTAPE 61,604,(NWT(IZ),JCT(2*IZ-1),JCT(2*IZ),JTAL(IZ),ITA
     1L(IZ),IZ=1,IOT)
604   FORMAT(1X,3(I2,2A8,2(5X,I4)))
      CALL MODIFY(JTAL,ITAL,IOT,NWT,JCT,ISIG,ICC)
      WRITE(61,335)
      WRITE(61,376) INC,NAME1,NAME2,ICUTNO,ICUTWT
      IF(ISIG) 499,499,399
399   WRITE(61,599)
      ISIG=0
599   FORMAT(//,*THE FOLLOWING CATAGORIES WERE WEIGHTED AS SHOWN*)
      WRITE(61,699) (ICC(II),IL=1,10)
699   FORMAT(//,2X,10A8)
499   WRITE(61,463)
463   FORMAT(///,2X,*REL. CAT*,6X,*NON REL. CAT*)
      WRITE(61,464)(JJ,MCAT(JJ),JJ,NCAT(JJ),JJ=1,34)
464   FORMAT(2X,I2,2X,I4,8X,I2,3X,I4)
      CALL SORT (INEX(1),INEX(2*JEX-1),2,1,1,1)
      WRITE(61,1000)
      WRITE(61,1004)
1004  FORMAT(2X,*THE FOLLOWING TERMS WERE FOUND IN THE  NON-RELEVANT DOC
     1UMENTS  *)
      DO 1005 JJ=1,JEX
      IDX=INEX(2*JJ)
      IDY=INEX(2*JJ-1)
      IDTR=ITERMS(2*IDX-1)
      IDTRP=ITERMS(2*IDX)
1005  WRITE(61,1002) (IDTR,IDTRP,IDY)
      DO 444   JJ=1,100
      ITAL(JJ)=0
444   JTAL(JJ)=0
761   GO TO(7001,7002) INDIC
7001  BUFFER IN(60,0)(IRD(1),IRD(10))
804   IF(UNIT,60) 804,9712,762
762   CALL EXIT
7002  INDIC=1
      DO 701 JRD=1,10
701   IRD(JRD)=INFO(JRD)
7003  IF(UNIT,60) 7003,9712,762
```

```
      SUBROUTINE MATCH(K,IFIN,ICT,IBUFO,ITAL,ITAB,IMT,INFX,ITERMS,JEX,IC
     1NT)
      DIMENSION ICT(1),IBUFO(1),ITAL(1),ITAB(7)
      DIMENSION INFX(1),ITERMS(1)
      DIMENSION IMT(1)
      IX=1
      IFX=778
      IFF=7777777777770UF
      ICM=ICT(2*IFIN).AND.IFX
702   IX=IX+2
      IIFX=1
      IBUFB=IBUFO(IX+1)
      IBUFA=IBUFO(IX)
      GO TO (710,613) ICNT
710   IF(INEX(1)-0) 606,601,606
601   ITERMS(2*IIFX-1) =IBUFA
      ITERMS(2*IIFX)=IBUFB
      JEX=1
      INEX(1)=JEX
      INEX(2)=5
      GO TO 613
606   IF(ITERMS(2*IIFX-1)-IBUFA) 608,607,608
607   IF(ITERMS(2*IIFX)-IBUFB) 608,609,608
609    INEX(2*IIFX-1) = INEX(2*IIFX-1)+1
      GO TO 613
613   IF(IIFX-IFX) 610,611,611
610   IIFX=IIFX+1
      GO TO 606
611   IF(JEX-500) 612,612,613
612   JEX=IEX+1
      INEX(2*JFX)=JEX
      INEX(2*JFX-1)=1
      ITERMS(2*JFX-1)=IBUFA
      ITERMS(2*JFX)=IBUFB
613   IF(ICM-16) 301,302,302
302   IMT(IFIN)=ICT(2*IFIN)
      GO TO 503
301   IF(ICM-0) 401,302,401
401   IF(ICM-8) 101,100,102
100   IBUFB=0
      IMT(IFIN)=ICT(2*IFIN).AND.IFF
      IBUFA=IBUFO(IX+2)
      GO TO 504
101   IBUFA=IBUFO(IX+2).AND.ITAB(ICM)
      IMT(IFIN)=ICT(2*IFIN).AND.IFF
      IBUFB=0
      GO TO 503
102   IBUFB=IBUFO(IX+3).AND.ITAB(ICM-8)
      IMT(IFIN)=ICT(2*IFIN).AND.IFF
      IBUFA=IBUFO(IX+2)
503   IF(ICT(2*IFIN-1)-IBUFA) 804,502,804
502   IF(IMT(IFIN)-IBUFB) 804,504,804
504   ITAL(IFIN)=ITAL(IFIN)+1
      GO TO (560,561) ICNT
560   IF(IX+1-K) 702,633,633
633   ICNT=2
```

```
561    RETURN
804    IF(IX+1-K) 702,603,603
603    ICNT=2
       RETURN
       END
```

```
      SUBROUTINE MODIFY(JTAL,ITAL,IOT,NWT,JCT,ISIG,ICC)
      COMMON INC,NAME1,NAME2,ICUTNO,ICUTWT
      DIMENSION ICC(1)
      DIMENSION JTAL(1),ITAL(1),NWT(1),JCT(1)
      DIMENSION NTM(100),NTMA(100),NTMB(100),NWTM(100)
      IPAS=1
      DO 100 I=1,IOT
      IF(JTAL(I)) 9100,9101,9100
9101  IF(ITAL(I)) 9100,1090,9100
9100  IF(JTAL(I)-ITAL(I)) 1,1090,2
   1  AJ=JTAL(I)
      AI=ITAL(I)
      IF(NWT(I)) 10,10,11
  11  WT=-NWT(I)
      NTM(I)=-NWT(I)
      WTP=NWT(I)
      GO TO 1010
  10  WT=NWT(I)
      NTM(I)=NWT(I)
      WTP=NWT(I)
1010  FTP=-AJ/AI
      FRP=1+FTP
      IF(WT) 2080,2080,2081
2080  AD=-.5
      GO TO 2082
2081  AD=.5
2082  FWT=WT*FRP+AD
      NWT(I)=FWT
      FWT=WT*EXPF(FTP)+AD
      NTMA(I)=FWT
      FWT=WTP*EXPF(FTP)+AD
      NTMB(I)=FWT
      FWT=WTP*FRP+AD
      NWTM(I)=FWT
      IF(NWT(I)) 600,601,600
 601  NWT(I)=1
 600  IF(NTMA(I)) 602,603,602
 603  NTMA(I)=1
 602  IF(NTMB(I)) 604,605,604
 605  NTMB(I)=1
 604  IF(NWTM(I)) 100,607,100
 607  NWTM(I)=1
      GO TO 100
   2  AI=JTAL(I)
      AJ=ITAL(I)
      IF(NWT(I)) 700,700,701
 700  WT=-NWT(I)
      NTM(I)=-NWT(I)
      WTP=NWT(I)
      GO TO 1010
 701  WT=NWT(I)
      NTM(I)=NWT(I)
      WTP=NWT(I)
      GO TO 1010
1090  NTM(I)=NWT(I)
      NWTM(I)=NWT(I)
```

```
      NTMA(I)=NWT(I)
      NTMB(I)=NWT(I)
  100 CONTINUE
 1420 WRITE(61,300)
  300 FORMAT(1H1)
      WRITE(61,400)
  400 FORMAT(2X,*THIS IS THE COMPUTERS OPINION ON THIS PROFILE*,///)
      WRITE(61,301) INC,NAME1,NAME2,ICUTNO,ICUTWT
  301 FORMAT(2X,*INTEREST CENTER-*,R5,10X,*STAFF MEMBER-*,2A8,4X,*CUT OF
     1F NO.-*,I3,4X,*CUTOFF WT.-*,I2)
      WRITE (61,302)
  302 FORMAT(25X,*REL.*,2X,*NON REL.*,22X,*REL.*,2X,*NON REL.*,22X,*REL.
     1*,2X,*NON REL.*)
 1410 GO TO (901,902,903,904,905,973) IPAS
  901 WRITE(61,920)
  920 FORMAT(2X,*THIS IS THE CHANGE SIGN ONLYPROFILE*)
      WRITE(61,304) (NTM(I),JCT(2*I-1),JCT(2*I),JTAL(I),ITAL(I),I=1,IOT)
  304 FORMAT(1X,3(I2,2A8,2(5X,I4)))
      GO TO 990
  902 WRITE(61,921)
  921 FORMAT(2X,*THIS IS THE LINEAR- CHANGE SIGN*)
      WRITE(61,304)(NWT(I),JCT(2*I-1),JCT(2*I),JTAL(I),ITAL(I),I=1,IOT)
      GO TO 990
  903 WRITE(61,922)
  922 FORMAT(2X,*THIS IS THE LINEAR-NO CHANGE SIGN*)
      WRITE(61,304)(NWTM(I),JCT(2*I-1),JCT(2*I),JTAL(I),ITAL(I),I=1,IOT)
      GO TO 990
  904 WRITE(61,923)
  923 FORMAT(2X,*THIS IS THE EXP-CHANGE SIGN*)
      WRITE(61,304)(NTMA(I),JCT(2*I-1),JCT(2*I),JTAL(I),ITAL(I),I=1,IOT)
      GO TO 990
  905 WRITE(61,924)
  924 FORMAT(2X,*THIS IS THE EXP-NO CHANGE SIGN*)
      WRITE(61,304)(NTMB(I),JCT(2*I-1),JCT(2*I),JTAL(I),ITAL(I),I=1,IOT)
  990 WRITE(61,306) INC,ICUTWT,ICUTNO,NAME1,NAME2
  306 FORMAT(*T*,R5,I2,1X,I3,2A8)
      IF(ISIG) 1990,1990,399
  399 WRITE(61,491) (ICC(IL),IL=1,10)
  491 FORMAT(10A8)
 1990 GO TO (499,972,1290,974,975) IPAS
 1290 ITT=1
      ITP=3
      WRITE (61,922)
 1214 WRITE(61,305)INC,(NWTM(JJ),JCT(2*JJ-1),JCT(2*JJ),JJ=ITT,ITP)
      IF(ITT-IOT) 986,986,988
  986 ITT=ITP+1
      ITP=ITP+3
      GO TO 1214
  974 ITT=1
      ITP=3
      WRITE(61,923)
 1215 WRITE(61,305)INC,(NTMA(JJ),JCT(2*JJ-1),JCT(2*JJ),JJ=ITT,ITP)
      IF(ITT-IOT) 989,988,988
  989 ITT=ITP+1
      ITP=ITP+3
      GO TO 1215
```

```
499   ITT=1
      ITP=3
971   WRITE(61,920)
1212  WRITE(61,305)INC,(NTM(JJ),JCT(2*JJ-1),JCT(2*JJ),JJ=ITT,ITP)
305   FORMAT(*S*,R5,3(I2,2A8))
      IF(ITT-IOT) 983,988,988
983   ITT=ITP+1
      ITP=ITP+3
      GO TO 1212
972   ITT=1
      ITP=3
      WRITE(61,921)
1213  WRITE(61,305)INC,(NWT(JJ),JCT(2*JJ-1),JCT(2*JJ),JJ=ITT,ITP)
      IF(ITT-IOT) 984,988,988
984   ITT=ITP+1
      ITP=ITP+3
      GO TO 1213
975   ITT=1
      ITP=3
      WRITE(61,924)
      WRITE(61,305)
      WRITE(61,304)(NTMB(JJ),JCT(2*JJ-1),JCT(2*JJ),JJ=ITT,ITP)
      IF(ITT-IOT) 987,988,988
987   ITT=ITP+1
      ITP=ITP+3
988   IPAS=IPAS+1
      GO TO 1420
973   RETURN
      END
```

APPENDIX H

List of Participants and Final Program for

National Conference on Technology Utilization

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